Comparison tables: BBOB 2012 noisy testbed with BBOB 2009 as reference

The BBOBies

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Abstract

This document provides tabular results of the workshop for Black-Box Optimization Benchmarking at GECCO 2012, see `http://coco.gforge.inria.fr/doku.php?id=bbob-2012`. 4 algorithms have been tested on 24 benchmark functions in dimensions between 2 and 40. A description of the used objective functions can be found in [4, 2]. The experimental set-up is described in [3].

The performance measure provided in the following tables is the expected number of objective function evaluations to reach a given target function value (ERT, expected running time), divided by the respective value for the best algorithm in BBOB-2009 (see [1]) if an algorithm from BBOB-2009 reached the given target function value. The ERT value is given otherwise ($\mathrm{ERT}_{\mathrm{best}}$ is noted as infinite). See [3] for details on how ERT is obtained. Bold entries in the table correspond to values below 3 or the top-three best values. Table 1 gives an overview on all algorithms submitted to the noise-free testbed in 2012.

Table 1: Names and references of all algorithms submitted for the noise-free testbed

algorithm short name	paper	reference
IPOPsaACM	Black-box Optimization Benchmarking of IPOP-saACM-ES on the BBOB-2012 Noisy Testbed (Page 261)	[8]
SNES	Benchmarking Separable Natural Evolution Strategies on the Noiseless and Noisy Black-Box Optimization Testbeds (Page 205)	[7]
xNES	Benchmarking Exponential Natural Evolution Strategies on the Noiseless and Noisy Black-Box Optimization Testbeds (Page 213)	[5]
xNESas	Benchmarking Natural Evolution Strategies with Adaptation Sampling on the Noiseless and Noisy Black-Box Optimization Testbeds (Page 229)	[6]
SNES, xNES, xNESas	Comparing Natural Evolution Strategies to BIPOP-CMA-ES on Noiseless and Noisy Black-Box Optimization Testbeds (Page 237)	[9]

Table 2: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{101}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f101	1.8	8.0	10	14	20	23	15/15
IPOPsaACM	**3.4**(4)	**1.8**(2)	4.1(1)	**4.0**(1)*	**3.9**(0.6)$^{\star 4}$	**4.1**(0.6)$^{\star 4}$	15/15
SNES	4.4(4)	2.0(2)	**3.2**(2)	7.2(3)	11(2)	14(2)	15/15
xNES	8.4(7)	5.1(3)	6.8(3)	9.3(4)	12(3)	13(3)	15/15
xNESas	6.7(7)	3.4(2)	5.4(3)	8.0(4)	10(2)	12(2)	15/15

Table 3: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{102}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f102	1.8	7.1	11	19	25	31	15/15
IPOPsaACM	**3.1**(3)	**2.8**(2)	**3.1**(2)	**3.2**(0.8)$^{\star 2}$	**3.3**(0.6)$^{\star 3}$	**3.1**(0.6)$^{\star 4}$	15/15
SNES	6.6(8)	3.8(2)	4.3(2)	7.0(1)	8.6(1)	10(1)	15/15
xNES	5.1(6)	3.4(4)	4.4(5)	6.4(2)	8.0(3)	8.8(2)	15/15
xNESas	7.0(7)	42(4)	29(3)	20(7)	29(80)	26(65)	15/15

Table 4: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{103}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f103	1.8	7.9	9.4	9.4	10	14	15/15
IPOPsaACM	4.4(4)	2.9(3)	**3.8**(2)	**6.6**(1)$^{\star 2}$	**8.9**(3)$^{\star 3}$	**8.7**(2)$^{\star 4}$	15/15
SNES	4.3(5)	**2.6**(1)	4.2(2)	14(5)	35(23)	71(58)	15/15
xNES	**4.2**(4)	3.1(2)	5.2(3)	14(4)	25(10)	25(5)	15/15
xNESas	4.3(5)	4.4(5)	7.2(4)	14(5)	27(19)	28(15)	15/15

Table 5: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{104}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f104	5.4	15	194	248	256	263	15/15
IPOPsaACM	4.4(3)	**4.9**(4)	**1.5**(0.8)	**1.5**(0.6)	**1.5**(0.6)	**1.5**(0.6)*	15/15
SNES	12(7)	9.2(12)	3.7(4)	125(158)	∞	∞ *2e4*	0/15
xNES	4.7(6)	18(6)	5.7(7)	5.5(6)	7.5(16)	7.6(15)	15/15
xNESas	**3.4**(3)	32(5)	4.9(12)	4.9(10)	6.2(10)	6.3(10)	15/15

Table 6: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{105}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f105	5.4	15	357	381	397	410	15/15
IPOPsaACM	4.5(4)	11(4)	**0.90**(1)	**1.4**(2)	**1.4**(2)	**1.5**(2)	15/15
SNES	**4.3**(5)	**6.4**(8)	3.0(5)	52(53)	348(405)	∞ *2e4*	0/15
xNES	5.8(5)	37(8)	4.3(7)	5.7(10)	5.7(9)	5.7(9)	15/15
xNESas	54(6)	69(137)	7.2(12)	9.2(16)	11(16)	11(15)	15/15

∞

Table 7: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{106}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f106	5.4	15	139	352	490	650	15/15
IPOPsaACM	**2.7**(2)	**4.2**(4)	**1.1**(0.7)	**0.72**(0.5)	**0.63**(0.4)	**0.58**(0.4)*	15/15
SNES	5.3(5)	4.5(4)	8.0(11)	48(46)	296(328)	∞ *2e4*	0/15
xNES	5.6(6)	5.8(5)	2.3(3)	3.0(3)	3.2(5)	2.8(4)	15/15
xNESas	5.1(5)	11(11)	6.1(5)	4.5(4)	3.6(3)	2.9(2)	15/15

Table 8: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{107}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f107	1.8	13	28	158	255	421	15/15
IPOPsaACM	**5.2**(6)	**1.8**(2)	**2.1**(2)	1.2(0.7)	1.4(0.6)	1.1(0.4)	15/15
SNES	15(21)	3.9(4)	2.7(3)	**1.1**(0.6)	**1.3**(0.4)	**1.0**(0.2)	15/15
xNES	27(19)	33(114)	18(55)	5.2(10)	3.6(6)	2.9(4)	13/15
xNESas	154(9)	90(171)	44(81)	10(15)	7.7(9)	5.6(6)	15/15

Table 9: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{108}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f108	1.8	30	202	3422	7369	15979	15/15
IPOPsaACM	**15**(14)	**10**(13)	4.8(7)	**1.0**(0.6)	**1.2**(1)$^{\star 3}$	**0.88**(0.5)$^{\star 3}$	15/15
SNES	53(74)	10(15)	**2.8**(3)	2.5(2)	∞	∞ *2e4*	0/15
xNES	170(558)	49(66)	11(13)	10(13)	287(327)	∞ *1e5*	0/15
xNESas	502(1112)	100(123)	31(31)	34(30)	406(434)	∞ *2e5*	0/15

Table 10: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{109}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f109	1.8	10	13	68	96	96	15/15
IPOPsaACM	4.3(6)	**2.2**(2)	4.3(4)	**2.3**(2)	**3.3**(2)	**5.5**(3)	15/15
SNES	**3.9**(2)	2.4(1)	**3.6**(2)	2.6(1)	11(10)	336(417)	1/15
xNES	5.8(5)	3.6(4)	5.5(4)	5.8(3)	5.3(3)	8.7(12)	15/15
xNESas	5.4(6)	5.7(12)	11(10)	5.7(4)	9.1(17)	11(22)	15/15

Table 11: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{110}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f110	7.1	34	623	2319	8407	9154	14/15
IPOPsaACM	**4.1**(3)	5.8(2)	2.6(2)	**2.9**(3)	**1.1**(0.9)	**1.0**(0.8)	15/15
SNES	5.9(7)	**2.9**(4)	**1.2**(1)	8.4(9)	34(38)	∞ *2e4*	0/15
xNES	11(7)	26(30)	4.2(7)	4.2(4)	1.4(1)	1.3(1)	14/15
xNESas	7.1(8)	53(118)	8.8(10)	5.4(6)	2.2(2)	2.3(3)	15/15

Table 12: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{111}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f111	24	119	718	12718	61860	1.7e5	15/15
IPOPsaACM	5.9(3)	3.6(7)	4.1(3)	7.9(11)	**2.7**(3)	**1.0**(1)	15/15
SNES	**4.7**(5)	**2.9**(3)	**1.9**(2)	**4.9**(6)	∞	∞ *2e4*	0/15
xNES	29(83)	13(21)	12(12)	7.0(7)	∞	∞ *2e5*	0/15
xNESas	50(90)	23(41)	17(21)	10(12)	∞	∞ *2e5*	0/15

Table 13: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{112}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f112	5.4	15	625	1154	1373	1531	15/15
IPOPsaACM	4.8(6)	4.9(3)	**0.51**(0.6)	**0.73**(0.5)	**0.97**(0.7)	**1.1**(0.6)	15/15
SNES	4.7(4)	**4.1**(2)	2.1(2)	42(45)	∞	∞ *2e4*	0/15
xNES	**3.1**(3)	12(10)	2.5(4)	3.6(4)	4.3(4)	4.2(4)	15/15
xNESas	4.1(4)	23(14)	2.7(5)	4.1(4)	6.0(6)	5.5(5)	15/15

Table 14: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{113}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f113	4.7	31	87	174	174	876	15/15
IPOPsaACM	**4.3**(5)	**3.0**(5)	11(20)	9.4(11)	9.4(11)	**2.0**(2)	15/15
SNES	8.8(11)	3.5(5)	**5.9**(8)	**6.5**(8)	**6.5**(8)	3.3(4)	14/15
xNES	7.6(9)	20(32)	14(29)	18(26)	18(26)	3.6(5)	15/15
xNESas	6.1(5)	25(75)	26(31)	30(57)	30(57)	6.0(11)	15/15

Table 15: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{114}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f114	8.9	43	698	5343	5343	8680	15/15
IPOPsaACM	18(20)	9.5(13)	3.2(3)	**1.3**(1)	**1.3**(1)	**1.1**(0.6)	15/15
SNES	**5.7**(5)	**5.0**(5)	**1.3**(1.0)	2.4(3)	2.4(3)	4.6(5)	0/15
xNES	37(114)	33(50)	11(12)	5.7(6)	5.7(6)	8.9(7)	5/15
xNESas	141(229)	162(261)	21(34)	17(20)	17(20)	20(23)	5/15

Table 16: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{115}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f115	3.2	13	225	394	394	543	15/15
IPOPsaACM	**5.2**(4)	**4.4**(4)	2.0(3)	**2.0**(2)	**2.0**(2)	**1.8**(2)	15/15
SNES	5.2(5)	6.4(2)	**1.3**(2)	2.4(4)	2.4(4)	7.6(14)	11/15
xNES	6.4(7)	24(74)	6.3(9)	5.3(6)	5.3(6)	4.7(5)	15/15
xNESas	5.2(4)	24(5)	3.8(9)	6.2(13)	6.2(13)	4.9(11)	15/15

Table 17: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{116}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f116	49	101	155	275	1041	1788	15/15
IPOPsaACM	14(19)	18(20)	13(13)	7.8(8)	2.3(2)	1.5(1)	15/15
SNES	2.7(4)	12(10)	20(16)	229(264)	∞	∞ *2e4*	0/15
xNES	15(51)	**8.4**(25)	**9.1**(17)	**5.6**(9)	**1.6**(2)	**0.98**(1)	15/15
xNESas	**2.0**(2)	26(43)	21(29)	14(16)	3.8(4)	3.0(6)	15/15

Table 18: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{117}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f117	167	1346	6454	28223	36420	43231	15/15
IPOPsaACM	3.7(7)	3.4(6)	2.0(2)	**0.73**(0.6)	**0.70**(0.4)	**0.73**(0.3)	15/15
SNES	**2.2**(5)	**1.1**(2)	**1.0**(1)	∞	∞	∞ *2e4*	0/15
xNES	5.0(6)	3.0(5)	2.8(4)	6.6(7)	62(62)	∞ *2e5*	0/15
xNESas	23(26)	9.4(9)	3.4(4)	5.4(6)	80(88)	∞ *2e5*	0/15

Table 19: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{118}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f118	21	103	132	584	776	972	15/15
IPOPsaACM	3.7(2)	**1.4**(1)	**1.4**(1)	**0.58**(0.4)	**0.64**(0.4)	**0.77**(0.5)	15/15
SNES	7.3(10)	12(12)	27(33)	51(59)	∞	∞ *2e4*	0/15
xNES	**3.6**(3)	1.8(1)	2.6(3)	1.5(2)	1.9(2)	2.1(2)	15/15
xNESas	15(3)	4.4(5)	5.4(15)	1.5(4)	1.6(3)	2.3(4)	15/15

Table 20: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{119}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f119	1.4	11	71	1040	4767	10082	15/15
IPOPsaACM	**2.4**(2)	8.6(16)	1.9(2)	0.47(0.6)	**0.99**(0.7)	**0.82**(0.2)	15/15
SNES	5.2(4)	**5.2**(6)	**1.5**(1)	**0.44**(0.2)$_{\downarrow 3}$	4.4(5)	30(33)	1/15
xNES	5.3(8)	65(7)	10(1)	2.4(5)	1.6(1)	1.1(1)	14/15
xNESas	10(11)	61(218)	13(33)	2.9(4)	2.2(3)	1.8(2)	15/15

Table 21: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{120}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f120	1.4	11	374	5724	75406	1.9e5	15/15
IPOPsaACM	5.1(7)	**10**(12)	2.0(2)	**2.0**(2)*	**0.46**(0.4)$_\downarrow$	**0.51**(0.4)$_\downarrow$	15/15
SNES	**4.8**(9)	11(15)	**0.98**(1.0)	50(56)	∞	∞ *2e4*	0/15
xNES	107(33)	193(307)	12(20)	11(7)	∞	∞ *1e5*	0/15
xNESas	8.8(6)	160(375)	13(18)	23(24)	∞	∞ *2e5*	0/15

Table 22: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{121}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f121	1.4	7.1	42	327	1120	1702	15/15
IPOPsaACM	**2.5**(4)	**2.1**(2)	1.2(0.7)	**1.2**(0.7)	**1.0**(0.4)	**1.2**(0.4)	15/15
SNES	3.5(6)	4.7(5)	1.4(0.8)	1.9(2)	255(286)	∞ *2e4*	0/15
xNES	4.4(5)	4.4(4)	1.7(1)	1.3(0.9)	1.2(1.0)	1.7(2)	15/15
xNESas	3.0(5)	2.6(2)	**1.1**(0.7)	1.7(0.8)	1.6(3)	2.3(4)	15/15

Table 23: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{122}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f122	2.9	95	523	2244	4351	9561	15/15
IPOPsaACM	**3.9**(5)	**1.1**(0.7)	1.3(1)	**1.2**(1)	**1.2**(0.7)	**0.79**(0.4)$^{\star 3}$	15/15
SNES	18(13)	2.2(3)	**0.94**(1)	3.2(4)	65(75)	∞ *2e4*	0/15
xNES	116(343)	17(32)	4.9(7)	7.0(9)	13(13)	35(38)	4/15
xNESas	106(28)	28(32)	14(19)	12(14)	19(15)	53(52)	3/15

Table 24: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{123}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f123	3.1	211	6371	38734	1.0e5	2.2e5	15/15
IPOPsaACM	40(34)	3.7(5)	**0.90**(0.7)	**0.95**(0.4)	**0.68**(0.5)	**0.82**(0.5)	15/15
SNES	**8.0**(18)	**2.8**(4)	2.2(2)	∞	∞	∞ *2e4*	0/15
xNES	68(10)	20(19)	8.3(9)	∞	∞	∞ *1e5*	0/15
xNESas	172(527)	47(55)	12(16)	∞	∞	∞ *2e5*	0/15

Table 25: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{124}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f124	3.5	64	316	1991	5595	9019	15/15
IPOPsaACM	**2.3**(2)	3.4(1)	1.4(2)	**0.84**(0.7)	**1.1**(0.8)$^{\star 4}$	**2.4**(1)	15/15
SNES	4.0(3)	**1.9**(3)	**0.91**(0.9)	71(72)	∞	∞ *2e4*	0/15
xNES	4.0(5)	6.3(17)	2.7(5)	4.6(5)	23(22)	41(46)	5/15

Table 26: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{125}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f125	1	1	1	1150	3854	7556	15/15
IPOPsaACM	1.1(0)	**4.1**(4)	37(34)	1.9(3)	**1.4**(1)	**1.6**(2)	15/15
SNES	**1**(0)	6.3(9)	40(49)	**0.82**(1)	2.7(2)	12(13)	1/15
xNES	1.1(0)	6.8(9)	60(48)	4.6(5)	5.1(6)	3.1(3)	14/15
xNESas	1.3(1)	6.1(4)	**30**(32)	7.2(7)	7.1(8)	8.4(10)	14/15

Table 27: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{126}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f126	1	1	1	3417	11056	36387	15/15
IPOPsaACM	**1**(0)	9.2(10)	70(89)	**1.3**(1)	**1.3**(1)	**1.4**(1)	15/15
SNES	**1**(0)	5.5(8)	**66**(79)	1.5(2)	8.2(9)	∞ *2e4*	0/15
xNES	1.1(0)	6.1(6)	667(1505)	4.4(4)	7.3(8)	60(67)	0/15
xNESas	1.1(0)	**3.3**(2)	980(2133)	10(13)	12(5)	25(25)	1/15

Table 28: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{127}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f127	1	1	1	1185	6771	7277	13/15
IPOPsaACM	1.3(0)	5.5(6)	75(59)	2.5(2)	**0.94**(1)	**1.1**(1)	15/15
SNES	**1.1**(0.5)	4.9(5)	**37**(31)	**1.6**(1)	1.7(2)	19(21)	0/15
xNES	1.8(0.5)	5.7(6)	167(87)	7.4(10)	2.6(3)	5.0(6)	15/15
xNESas	1.3(0)	**4.3**(6)	67(77)	8.9(14)	3.5(4)	5.5(6)	15/15

Table 29: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{128}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f128	1.8	41	134	387	593	620	15/15
IPOPsaACM	1.5(1)	8.1(8)	22(23)	19(28)	83(23)	91(23)	15/15
SNES	1.6(1)	**5.1**(6)	**2.0**(3)	**1.2**(1)	**0.93**(0.8)	**1.3**(2)	15/15
xNES	1.4(0.8)	46(72)	22(23)	10(13)	6.9(8)	6.6(8)	15/15
xNESas	**1.2**(1)	32(61)	65(99)	32(39)	23(26)	22(25)	15/15

Table 30: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{129}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f129	1.8	65	220	1902	5944	10661	15/15
IPOPsaACM	1.4(2)	**3.3**(4)	11(9)	2.7(3)	**1.6**(1)	**1.2**(1)*	15/15
SNES	1.4(1)	3.5(4)	**3.0**(4)	**1.6**(2)	1.9(2)	13(14)	0/15
xNES	**0.85**(0.6)	25(32)	19(23)	5.0(6)	5.5(6)	11(10)	9/15
xNESas	1.1(0.8)	25(67)	35(36)	14(13)	18(13)	25(22)	6/15

Table 31: 02-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{130}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f130	1.5	45	198	797	1772	4442	15/15
IPOPsaACM	1.7(1)	4.8(5)	8.2(15)	6.8(4)	12(13)	26(49)	15/15
SNES	1.4(1.0)	**3.6**(4)	**2.6**(4)	**1.0**(1)	**0.62**(0.7)	**0.50**(0.4)	15/15
xNES	**1.3**(1)	20(24)	16(32)	4.2(8)	1.9(4)	0.81(1)	15/15
xNESas	1.7(2)	57(89)	35(54)	8.9(13)	4.9(7)	2.0(3)	15/15

Table 32: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{101}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f101	3.6	13	19	28	33	38	15/15
IPOPsaACM	**3.7**(4)	**3.0**(2)	**3.3**(0.6)	**3.1**(0.7)$^{\star 3}$	**3.4**(0.5)$^{\star 4}$	**3.5**(0.4)$^{\star 4}$	15/15
SNES	4.3(3)	3.2(1)	3.9(2)	7.7(1)	11(1)	13(0.9)	15/15
xNES	5.3(4)	3.8(2)	5.4(2)	8.6(2)	12(2)	14(1)	15/15
xNESas	4.9(4)	3.3(2)	4.3(2)	7.6(2)	11(2)	13(2)	15/15

Table 33: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{102}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f102	3.6	12	23	32	39	48	15/15
IPOPsaACM	4.4(6)	3.2(2)	**2.5**(1)	**2.7**(0.5)$^{\star 4}$	**2.9**(0.6)$^{\star 4}$	**3.0**(0.5)$^{\star 4}$	15/15
SNES	4.9(6)	3.8(2)	3.4(2)	6.7(1)	9.1(1)	10(1)	15/15
xNES	4.6(4)	3.5(2)	4.1(3)	6.9(1)	10(2)	11(1)	15/15
xNESas	**3.6**(5)	**3.2**(2)	3.8(2)	6.8(1)	8.6(1)	10(2)	15/15

Table 34: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{103}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f103	3.6	13	19	19	23	43	15/15
IPOPsaACM	**2.9**(3)	**2.6**(2)	**3.1**(0.8)	**4.8**(1.0)$^{\star 4}$	**6.8**(3)$^{\star 3}$	**4.9**(2)$^{\star 4}$	15/15
SNES	4.4(4)	3.1(2)	4.2(1)	12(2)	24(15)	32(25)	15/15
xNES	4.5(5)	3.0(2)	4.3(3)	11(2)	18(4)	14(2)	15/15
xNESas	5.2(5)	3.5(2)	4.6(2)	12(3)	15(5)	12(2)	15/15

Table 35: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{104}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f104	30	207	602	648	658	668	15/15
IPOPsaACM	3.0(2)	**1.4**(0.4)	**0.83**(1)	**0.91**(1)*	**0.95**(1)$^{\star 2}$	**0.98**(1)$^{\star 2}$	15/15
SNES	**1.8**(0.9)	1.9(4)	28(26)	125(120)	∞	∞ *3e4*	0/15
xNES	2.4(1)	1.7(2)	2.3(4)	3.3(4)	3.4(4)	3.6(4)	15/15
xNESas	2.7(1)	4.0(0.5)	4.9(8)	10(16)	10(16)	10(15)	15/15

Table 36: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{105}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f105	28	507	1070	3247	3271	3297	5/15
IPOPsaACM	3.4(2)	0.97(2)	**1.3**(2)	**0.47**(0.5)	**0.48**(0.5)	**0.48**(0.5)	15/15
SNES	**2.4**(2)	**0.92**(0.9)	16(15)	45(46)	135(143)	∞ *3e4*	0/15
xNES	2.4(0.9)	2.8(8)	3.9(8)	3.0(3)	3.0(3)	3.1(3)	15/15
xNESas	17(2)	6.0(15)	9.3(11)	6.0(10)	6.7(10)	6.6(10)	15/15

Table 37: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{106}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f106	29	68	156	759	1294	1447	15/15
IPOPsaACM	2.5(1)	**2.7**(2)	**1.8**(0.9)*	**0.48**(0.2)$^{\star 2}$	**0.36**(0.1)$^{\star 2}_{\downarrow 4}$	**0.36**(0.1)$^{\star 3}_{\downarrow 4}$	15/15
SNES	2.6(2)	5.7(9)	77(86)	∞	∞	∞ *3e4*	0/15
xNES	**2.3**(1)	3.9(2)	10(20)	2.6(4)	1.8(2)	1.7(2)	15/15
xNESas	2.7(2)	16(3)	9.3(4)	3.3(6)	2.1(4)	2.0(3)	15/15

Table 38: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{107}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f107	5.9	47	153	325	505	685	15/15
IPOPsaACM	**4.0**(3)	**1.4**(1)	**0.96**(0.5)	**1.3**(0.7)	**1.3**(0.6)	1.3(0.4)	15/15
SNES	15(23)	3.3(5)	1.5(2)	1.5(0.7)	1.4(0.4)	**1.3**(0.4)	15/15
xNES	64(26)	17(32)	5.6(10)	3.9(5)	3.0(3)	2.5(2)	15/15
xNESas	107(24)	14(3)	5.0(1)	3.0(1.0)	2.4(0.5)	2.9(6)	15/15

Table 39: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{108}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f108	5.8	98	1966	10825	17187	32181	15/15
IPOPsaACM	**11**(15)	7.2(11)	1.1(1)	**0.83**(0.5)$^{\star 4}$	**1.1**(0.8)$^{\star 4}$	**0.93**(0.4)$^{\star 4}$	15/15
SNES	26(40)	**6.0**(8)	**0.69**(0.5)	∞	∞	∞ *3e4*	0/15
xNES	62(34)	36(54)	12(19)	150(165)	∞	∞ *2e5*	0/15
xNESas	213(641)	56(101)	10(11)	80(85)	∞	∞ *4e5*	0/15

Table 40: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{109}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f109	3.6	21	93	193	251	251	15/15
IPOPsaACM	**3.2**(3)	**1.7**(1)	0.85(0.2)	2.1(2)	3.2(2)	**4.5**(3)	15/15
SNES	3.9(5)	1.8(1)	**0.73**(0.4)	1.8(1)	9.1(11)	502(593)	0/15
xNES	3.6(5)	1.9(1)	1.00(0.6)	**1.7**(0.8)	3.0(2)	5.7(2)	15/15
xNESas	3.8(4)	1.8(2)	0.86(0.5)	1.8(0.7)	**2.6**(0.8)	6.6(5)	15/15

Table 41: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{110}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f110	56	922	6277	35327	61979	63571	15/15
IPOPsaACM	1.6(1)	2.7(4)	3.0(4)	**0.97**(1.0)	**0.57**(0.6)	**0.57**(0.6)	15/15
SNES	2.7(3)	**0.82**(1)	2.8(2)	1.8(2)	∞	∞ *3e4*	0/15
xNES	2.9(3)	4.5(6)	**2.1**(3)	1.1(1)	0.74(0.9)	0.72(0.8)	15/15
xNESas	**1.5**(1.0)	2.5(4)	4.5(3)	1.8(2)	1.1(0.9)	1.3(1.0)	15/15

Table 42: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{111}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f111	174	3475	29972	1.9e5	1.4e6	1.5e6	14/15
IPOPsaACM	3.8(6)	1.2(2)	9.1(18)	**4.9**(4)	**0.70**(0.6)	**0.71**(0.6)	15/15
SNES	**2.1**(2)	**0.94**(0.4)	7.1(8)	∞	∞	∞ *3e4*	0/15
xNES	12(16)	4.7(6)	3.1(3)	∞	∞	∞ *2e5*	0/15
xNESas	12(20)	3.5(4)	**1.3**(2)	16(17)	∞	∞ *4e5*	0/15

Table 43: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{112}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f112	29	338	1568	2849	3105	3534	15/15
IPOPsaACM	3.3(2)	1.7(2)	**0.87**(0.9)	**0.78**(0.4)	**0.83**(0.4)	**0.82**(0.4)	15/15
SNES	2.8(2)	1.8(2)	9.0(10)	∞	∞	∞ *3e4*	0/15
xNES	**2.5**(2)	**1.0**(0.7)	1.4(2)	2.7(3)	4.0(5)	4.1(4)	15/15
xNESas	2.8(3)	8.0(13)	5.6(7)	5.3(6)	5.2(6)	7.2(8)	15/15

Table 44: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{113}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f113	26	126	1948	3236	3236	3428	12/15
IPOPsaACM	4.2(6)	4.4(7)	0.75(1)	**0.70**(0.9)	**0.70**(0.9)	**0.74**(0.8)	15/15
SNES	2.6(3)	**2.7**(3)	**0.69**(1)	0.92(0.9)	0.92(0.9)	1.1(1)	15/15
xNES	**1.5**(0.9)	5.4(13)	1.5(3)	1.5(2)	1.5(2)	1.5(2)	15/15
xNESas	8.8(8)	25(28)	4.8(6)	3.4(4)	3.4(4)	3.6(3)	15/15

Table 45: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{114}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f114	26	1015	6279	28324	28324	32580	15/15
IPOPsaACM	**10**(15)	**1.3**(2)	**0.96**(0.9)	**0.40**(0.3)$^{\star 2}$	**0.40**(0.3)$^{\star 2}$	**0.41**(0.3)$^{\star 2}$	15/15
SNES	12(15)	1.4(2)	2.8(3)	16(16)	16(15)	∞ *3e4*	0/15
xNES	30(89)	4.7(6)	6.3(8)	13(14)	13(14)	21(24)	3/15
xNESas	146(189)	11(17)	9.5(11)	24(20)	24(20)	45(49)	2/15

Table 46: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{115}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f115	12	118	593	890	890	1246	15/15
IPOPsaACM	**2.8**(2)	**1.1**(0.5)	**1.2**(1.0)	**1.5**(2)	**1.5**(2)	**1.5**(2)	15/15
SNES	3.8(3)	1.9(2)	1.6(1)	10(17)	10(17)	11(14)	9/15
xNES	6.5(4)	6.9(13)	4.8(10)	4.6(9)	4.6(9)	3.4(7)	15/15
xNESas	4.9(5)	4.3(0.6)	3.8(5)	2.7(4)	2.7(4)	4.1(8)	15/15

Table 47: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{116}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f116	169	2642	4419	7143	9614	11370	15/15
IPOPsaACM	3.9(7)	**0.77**(0.9)	**0.60**(0.6)	**0.50**(0.3)	**0.41**(0.3)	**0.37**(0.2)	15/15
SNES	**3.8**(4)	1.2(1)	3.8(4)	30(32)	∞	∞ *3e4*	0/15
xNES	9.5(15)	1.3(3)	1.1(2)	0.74(1)	0.60(0.9)	0.80(0.9)	15/15
xNESas	24(63)	4.7(7)	3.1(4)	1.9(2)	1.7(2)	1.5(2)	15/15

Table 48: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{117}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f117	2392	14361	39508	61720	73678	80041	15/15
IPOPsaACM	2.5(3)	**1.3**(1)	**0.71**(0.4)	**0.54**(0.2)	**0.57**(0.2)	**0.60**(0.2)	15/15
SNES	**1.5**(2)	1.8(2)	11(13)	∞	∞	∞ *3e4*	0/15
xNES	3.9(7)	2.3(3)	3.1(4)	57(59)	∞	∞ *2e5*	0/15
xNESas	3.6(5)	5.1(7)	6.9(7)	∞	∞	∞ *4e5*	0/15

Table 49: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{118}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f118	109	205	712	1008	1283	1593	15/15
IPOPsaACM	**1.1**(0.4)	**0.75**(0.3)*	**0.35**(0.1)$_{\downarrow 3}$	**0.52**(0.2)$_{\downarrow 3}$	**0.70**(0.4)$_{\downarrow}$	**0.76**(0.3)	15/15
SNES	3.9(4)	15(16)	20(16)	∞	∞	∞ *3e4*	0/15
xNES	1.5(1)	2.0(1)	0.79(0.6)	1.3(2)	1.6(2)	1.5(2)	15/15
xNESas	1.6(0.6)	1.3(0.8)	0.53(0.2)$_{\downarrow 2}$	0.60(0.2)$_{\downarrow 2}$	1.1(0.2)	1.1(0.2)	15/15

Table 50: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{119}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f119	2.2	66	421	2005	12038	15719	15/15
IPOPsaACM	**2.8**(3)	**1.3**(2)	**0.45**(0.3)	**0.65**(0.5)	**0.55**(0.4)	**0.84**(0.7)	15/15
SNES	12(20)	2.6(3)	0.68(0.5)	0.67(0.6)	11(12)	∞ *3e4*	0/15
xNES	9.0(14)	18(58)	3.5(9)	2.0(2)	0.65(1)	1.1(1.0)	15/15
xNESas	8.2(9)	7.4(4)	2.6(7)	2.6(3)	1.1(1)	1.3(2)	15/15

Table 51: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{120}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f120	2.2	81	1802	31935	1.2e5	2.7e5	15/15
IPOPsaACM	**20**(50)	9.0(18)	1.6(2)	**0.57**(0.2)$^{\star 4}$	**0.40**(0.2)$_{\downarrow 2}$	**0.51**(0.3)	15/15
SNES	23(67)	**6.9**(10)	**1.2**(2)	∞	∞	∞ *3e4*	0/15
xNES	414(1025)	55(83)	12(14)	50(51)	∞	∞ *2e5*	0/15
xNESas	29(40)	57(53)	13(18)	105(106)	∞	∞ *5e5*	0/15

Table 52: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{121}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f121	2.2	41	116	699	2297	3321	15/15
IPOPsaACM	3.6(5)	**1.0**(1.0)	1.5(0.6)	1.1(1)	0.96(0.3)	1.1(0.8)	15/15
SNES	**2.9**(4)	1.4(1)	1.1(0.4)	2.7(3)	∞	∞ *3e4*	0/15
xNES	7.7(11)	1.4(1.0)	**1.0**(0.5)	0.89(0.6)	**0.65**(0.4)	**0.86**(0.6)	15/15
xNESas	4.8(7)	1.7(3)	1.3(1)	**0.83**(0.3)	0.82(0.5)	1.0(1.0)	15/15

Table 53: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{122}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f122	5.8	357	1802	7595	12242	19009	15/15
IPOPsaACM	3.1(2)	1.4(2)	1.3(2)	**0.90**(0.5)	**1.1**(1)$^{\star 2}$	**1.1**(0.7)$^{\star 3}$	15/15
SNES	6.3(7)	**0.86**(1)	**0.63**(0.6)	9.3(11)	∞	∞ *3e4*	0/15
xNES	**2.3**(2)	1.8(4)	3.9(5)	3.9(5)	17(19)	∞ *3e5*	0/15
xNESas	4.9(6)	13(24)	11(20)	8.0(8)	52(55)	∞ *5e5*	0/15

Table 54: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{123}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f123	4.9	1546	21830	93159	1.9e5	4.4e5	15/15
IPOPsaACM	23(21)	1.9(2)	**0.80**(0.6)$^{\star 3}$	**0.69**(0.2)	**0.78**(0.4)	**0.99**(0.7)	15/15
SNES	5.4(8)	**0.96**(0.8)	∞	∞	∞	∞ *3e4*	0/15
xNES	**5.1**(6)	4.9(6)	70(82)	∞	∞	∞ *2e5*	0/15
xNESas	24(66)	11(11)	38(44)	∞	∞	∞ *5e5*	0/15

Table 55: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{124}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f124	3.6	196	926	7091	12902	14882	14/15
IPOPsaACM	**2.2**(3)	0.71(0.6)	0.90(1)	**0.69**(0.5)	**1.1**(0.5)$^{\star 3}$	**1.3**(0.6)$^{\star 3}$	15/15
SNES	5.6(7)	**0.65**(0.7)	**0.59**(0.7)	∞	∞	∞ *3e4*	0/15
xNES	5.6(5)	2.1(0.5)	0.70(0.3)	1.7(2)	6.5(6)	105(115)	0/15

Table 56: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{125}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f125	1	1	1	24677	36351	38000	15/15
IPOPsaACM	**1**(0)	10(16)	343(650)	**0.91**(0.8)	**0.94**(0.8)	**1.0**(0.7)	15/15
SNES	1.1(0.5)	14(27)	260(286)	8.2(10)	∞	∞ *3e4*	0/15
xNES	1.1(0.5)	**9.3**(14)	189(266)	3.2(3)	8.4(10)	20(22)	3/15
xNESas	1.1(0.5)	15(10)	**131**(95)	5.5(6)	15(13)	29(30)	3/15

Table 57: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{126}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f126	1	1	1	1.1e5	6.3e5	9.6e5	15/15
IPOPsaACM	**1**(0)	12(24)	737(972)	**0.85**(1)	**0.84**(1)	**0.90**(1)	15/15
SNES	1.2(0.5)	39(48)	**399**(496)	∞	∞	∞ *3e4*	0/15
xNES	1.3(0.5)	**7.3**(10)	1716(3734)	14(16)	∞	∞ *2e5*	0/15
xNESas	1.3(0.5)	62(138)	2313(3108)	6.5(7)	∞	∞ *4e5*	0/15

Table 58: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{127}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f127	1	1	1	39085	45347	45996	8/15
IPOPsaACM	**1**(0)	10(9)	144(99)	**0.48**(0.6)	**0.77**(0.9)	**0.95**(1)	15/15
SNES	1.6(0)	11(12)	**112**(106)	1.9(2)	∞	∞ *3e4*	0/15
xNES	1.2(0.5)	**6.2**(6)	139(74)	1.6(2)	12(14)	22(24)	2/15
xNESas	1.3(0.5)	12(12)	244(376)	1.9(2)	5.6(7)	13(13)	8/15

Table 59: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{128}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f128	5.5	426	1125	1917	2715	4340	15/15
IPOPsaACM	2.6(3)	4.6(6)	18(32)	19(31)	198(553)	124(346)	13/15
SNES	2.6(3)	**2.7**(3)	**2.2**(3)	**1.3**(1)	**1.00**(1)	**0.68**(0.7)	15/15
xNES	42(16)	11(21)	9.1(10)	5.4(6)	3.8(4)	2.4(3)	15/15
xNESas	**1.5**(2)	30(21)	20(47)	12(27)	8.6(19)	5.4(12)	15/15

Table 60: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{129}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f129	4.8	362	3392	11584	28362	38534	15/15
IPOPsaACM	3.2(2)	10(6)	2.7(5)	4.6(3)	10(6)	**7.4**(5)	14/15
SNES	**1.8**(2)	**3.7**(4)	**0.69**(0.7)	**3.0**(3)	**4.7**(5)	11(12)	1/15
xNES	3.0(3)	6.5(9)	5.6(8)	6.3(7)	16(19)	21(20)	2/15
xNESas	3.5(7)	23(42)	6.5(9)	13(18)	27(32)	167(187)	0/15

Table 61: 03-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{130}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f130	5.5	245	515	1502	11944	14346	12/15
IPOPsaACM	2.2(2)	12(20)	15(18)	27(8)	13(3)	16(5)	14/15
SNES	3.1(4)	**3.7**(5)	**2.6**(2)	**0.98**(0.7)	**0.17**(0.1)$_\downarrow$	**0.34**(0.4)	12/15
xNES	2.2(2)	46(70)	42(58)	15(20)	2.0(3)	1.9(2)	15/15
xNESas	**1.5**(0.8)	11(22)	48(98)	17(33)	2.2(4)	2.0(4)	15/15

Table 62: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{101}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f101	11	37	44	62	69	75	15/15
IPOPsaACM	**1.9**(1)	**2.1**(0.5)	**2.2**(0.5)$^{\star 3}$	**2.2**(0.5)$^{\star 4}$	**2.5**(0.3)$^{\star 4}$	**2.8**(0.3)$^{\star 4}$	15/15
SNES	3.8(2)	2.5(0.9)	4.3(0.8)	6.1(0.7)	8.8(1.0)	11(1)	15/15
xNES	3.4(1)	2.4(1)	5.4(0.9)	10(1)	14(1)	18(0.6)	15/15
xNESas	2.8(2)	2.4(1)	5.2(2)	7.9(2)	10(2)	13(3)	15/15

Table 63: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{102}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f102	11	35	50	72	86	99	15/15
IPOPsaACM	**2.6**(2)	**2.1**(0.7)	**2.0**(0.5)$^{\star 3}$	**1.9**(0.4)$^{\star 4}$	**2.1**(0.3)$^{\star 4}$	**2.2**(0.3)$^{\star 4}$	15/15
SNES	3.5(2)	2.3(1)	3.7(1)	5.4(0.7)	7.3(0.7)	8.6(0.4)	15/15
xNES	3.1(4)	2.8(1)	4.9(1)	8.8(1)	12(1)	14(1)	15/15
xNESas	3.3(3)	2.7(2)	4.7(1)	7.3(1)	9.2(1)	10(2)	15/15

Table 64: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{103}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f103	11	28	30	31	35	115	15/15
IPOPsaACM	3.0(1)	2.8(0.7)	**3.4**(0.9)$^{\star 2}$	**4.6**(1)$^{\star 4}$	**7.1**(3)$^{\star 4}$	**3.2**(1)$^{\star 4}$	15/15
SNES	2.7(2)	**2.7**(1)	5.5(1)	13(2)	26(15)	21(11)	15/15
xNES	3.7(2)	3.6(1)	8.2(2)	20(3)	31(3)	13(1)	15/15
xNESas	**2.7**(2)	2.9(2)	7.2(2)	16(3)	24(5)	11(2)	15/15

Table 65: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{104}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f104	173	773	1287	1768	2040	2284	15/15
IPOPsaACM	**0.88**(0.3)	**1.5**(1)	**1.1**(1)	**0.89**(0.8)	**0.80**(0.7)*	**0.73**(0.7)*	15/15
SNES	1.5(0.6)	21(26)	44(42)	∞	∞	∞ *5e4*	0/15
xNES	1.4(0.7)	2.4(0.9)	5.6(10)	7.3(11)	6.4(10)	5.9(9)	15/15
xNESas	1.4(0.4)	2.4(0.6)	2.7(6)	2.3(4)	2.1(4)	2.0(3)	15/15

Table 66: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{105}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f105	167	1436	5174	10388	10824	11202	15/15
IPOPsaACM	1.4(0.5)	**1.5**(2)	**0.63**(0.4)	**0.33**(0.2)$\downarrow$3	**0.32**(0.2)$\downarrow$3	**0.32**(0.2)$\downarrow$3	15/15
SNES	1.7(0.4)	17(21)	12(12)	35(36)	∞	∞ *5e4*	0/15
xNES	**1.3**(0.5)	3.6(6)	4.9(7)	3.6(5)	4.0(5)	4.0(5)	15/15
xNESas	1.4(0.5)	4.0(4)	14(13)	11(7)	11(7)	10(7)	15/15

Table 67: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{106}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f106	92	529	1050	2666	2887	3087	15/15
IPOPsaACM	**1.7**(0.9)	**0.89**(0.2)$^{\star 2}$	**0.60**(0.2)$^{\star 3}$	**0.30**(0.1)$^{\star 3}_{\downarrow 4}$	**0.32**(0.1)$^{\star 3}_{\downarrow 4}$	**0.36**(0.1)$^{\star 3}_{\downarrow 4}$	15/15
SNES	3.9(1)	26(32)	209(239)	276(296)	∞	∞ *5e4*	0/15
xNES	2.9(1.0)	2.0(0.8)	2.2(0.8)	1.2(0.9)	1.2(0.9)	1.3(1)	15/15
xNESas	2.7(0.8)	3.3(0.9)	3.7(5)	2.2(3)	2.2(3)	2.7(3)	15/15

Table 68: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{107}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f107	40	228	453	940	1376	1850	15/15
IPOPsaACM	**1.4**(2)	**1.1**(0.7)	1.4(1)	**1.3**(0.8)	**1.4**(1.0)	1.9(1)	15/15
SNES	4.2(6)	2.0(1)	**1.4**(0.8)	1.3(0.9)	1.4(0.7)	**1.3**(0.5)	15/15
xNES	3.2(3)	31(66)	20(33)	10(16)	7.6(11)	45(8)	14/15
xNESas	3.2(5)	7.1(1)	4.2(0.5)	6.9(11)	7.2(8)	7.0(10)	15/15

Table 69: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{108}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f108	87	5144	14469	30935	58628	80667	15/15
IPOPsaACM	**7.8**(9)	**1.1**(1)	**0.60**(0.4)$^{\star 2}$	**0.80**(0.5)$^{\star 4}$	**0.74**(0.4)$^{\star 4}$	**1.0**(0.6)	15/15
SNES	15(20)	1.5(3)	8.4(10)	∞	∞	∞ *5e4*	0/15
xNES	84(117)	18(22)	36(28)	∞	∞	∞ *7e5*	0/15
xNESas	69(120)	12(17)	56(59)	∞	∞	∞ *1e6*	0/15

Table 70: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{109}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f109	11	57	216	572	873	946	15/15
IPOPsaACM	**2.9**(2)	**1.6**(0.6)	**0.83**(0.3)	**1.2**(0.3)	**1.2**(0.3)$^{\star 2}$	**1.6**(0.4)$^{\star 3}$	15/15
SNES	4.4(2)	1.9(0.7)	0.93(0.3)	1.8(1)	13(21)	371(385)	0/15
xNES	3.4(2)	2.0(0.8)	1.4(0.3)	2.0(0.5)	2.3(0.2)	4.1(0.7)	15/15
xNESas	3.6(2)	1.7(0.7)	1.3(0.5)	1.8(0.5)	2.3(0.6)	4.1(0.8)	15/15

Table 71: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{110}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f110	949	33625	1.2e5	5.9e5	6.0e5	6.1e5	15/15
IPOPsaACM	0.71(0.3)	5.6(7)	3.5(4)	**0.78**(0.8)	**0.84**(0.8)	**0.84**(0.8)	15/15
SNES	0.76(1)	**0.33**(0.2)$_\downarrow$	**0.65**(0.7)	∞	∞	∞ *5e4*	0/15
xNES	0.49(0.2)	1.3(2)	2.1(3)	1.7(2)	2.2(2)	2.2(2)	7/15
xNESas	**0.44**(0.2)	1.9(2)	3.6(5)	1.2(1)	1.6(2)	2.3(3)	8/15

Table 72: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{111}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f111	6856	6.1e5	8.8e6	2.3e7	3.1e7	3.1e7	3/15
IPOPsaACM	**0.50**(0.3)	7.4(8)	1.8(2)	**1.00**(1.0)	**0.74**(0.8)	**0.74**(0.8)	3/15
SNES	1.9(2)	∞	∞	∞	∞	∞ *5e4*	0/15
xNES	7.2(9)	4.1(5)	**0.61**(0.7)	∞	∞	∞ *8e5*	0/15
xNESas	5.4(8)	**1.8**(2)	0.96(1)	∞	∞	∞ *1e6*	0/15

Table 73: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{112}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f112	107	1684	3421	4502	5132	5596	15/15
IPOPsaACM	**1.4**(0.6)*	**1.5**(2)	**1.2**(0.9)	**1.2**(0.6)	**1.2**(0.6)	**1.2**(0.6)	15/15
SNES	1.9(0.4)	16(19)	19(20)	∞	∞	∞ *5e4*	0/15
xNES	4.6(1)	3.0(5)	3.0(3)	6.5(8)	12(15)	18(28)	15/15
xNESas	2.3(1)	2.6(5)	7.9(10)	17(18)	28(23)	37(38)	15/15

Table 74: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{113}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f113	133	1883	8081	24128	24128	24402	15/15
IPOPsaACM	3.0(2)	0.82(0.8)	**0.47**(0.6)	**0.35**(0.4)	**0.35**(0.4)	**0.35**(0.4)	15/15
SNES	1.8(2)	**0.78**(0.9)	2.1(3)	3.1(3)	3.1(3)	4.1(4)	5/15
xNES	10(6)	3.3(8)	2.1(3)	1.2(2)	1.2(2)	1.2(2)	15/15
xNESas	**1.2**(1)	2.4(4)	2.5(4)	1.4(2)	1.4(2)	1.5(2)	15/15

Table 75: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{114}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f114	767	14720	56311	83272	83272	84949	15/15
IPOPsaACM	2.6(3)	**0.73**(0.4)	**0.54**(0.4)$^{\star 3}$	**0.44**(0.2)$^{\star 2}$	**0.44**(0.2)$^{\star 2}$	**0.44**(0.3)$^{\star 2}$	15/15
SNES	**2.6**(3)	2.4(3)	∞	∞	∞	∞ *5e4*	0/15
xNES	10(17)	10(10)	33(37)	∞	∞	∞ *8e5*	0/15
xNESas	8.0(13)	9.1(13)	157(166)	∞	∞	∞ *1e6*	0/15

Table 76: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{115}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f115	64	485	1829	2550	2550	2970	15/15
IPOPsaACM	1.6(0.6)	0.98(1)	**1.2**(1)	**1.2**(0.8)	**1.2**(0.8)	**1.1**(0.7)	15/15
SNES	1.6(0.8)	1.8(2)	4.4(4)	40(43)	40(47)	45(43)	4/15
xNES	1.7(1)	1.9(0.3)	2.3(5)	2.5(5)	2.5(5)	2.6(4)	15/15
xNESas	**1.3**(0.9)	**0.88**(0.4)	1.8(4)	1.8(4)	1.8(4)	1.6(3)	15/15

Table 77: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{116}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f116	5730	14472	22311	26868	30329	31661	15/15
IPOPsaACM	1.0(1)	**0.74**(0.8)	**0.56**(0.5)	**0.59**(0.5)	**0.56**(0.4)$_{\downarrow}$	**0.56**(0.4)$_{\downarrow}$	15/15
SNES	1.6(1)	5.9(6)	∞	∞	∞	∞ *5e4*	0/15
xNES	**0.62**(1)	0.78(1)	1.3(2)	1.2(1)	1.2(1)	1.2(1)	14/15
xNESas	1.4(2)	1.2(2)	1.1(2)	1.3(1)	1.6(2)	1.8(2)	15/15

Table 78: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{117}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f117	26686	76052	1.1e5	1.4e5	1.7e5	1.9e5	15/15
IPOPsaACM	**0.60**(0.5)$^{\star 2}$	**0.43**(0.3)$^{\star 2}$	**0.42**(0.3)$^{\star 2}_{\downarrow 2}$	**0.54**(0.3)$_{\downarrow}$	**0.59**(0.3)	**0.60**(0.2)	15/15
SNES	6.3(6)	∞	∞	∞	∞	∞ *5e4*	0/15
xNES	9.4(13)	47(49)	∞	∞	∞	∞ *8e5*	0/15
xNESas	8.4(6)	39(47)	∞	∞	∞	∞ *1e6*	0/15

Table 79: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{118}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f118	429	1217	1555	1998	2430	2913	15/15
IPOPsaACM	$\mathbf{0.49}(0.1)^{\star 3}_{\downarrow 4}$	$\mathbf{0.25}(0.1)^{\star 3}_{\downarrow 4}$	$\mathbf{0.33}(0.1)^{\star 2}_{\downarrow 4}$	$\mathbf{0.48}(0.1)^{\star 2}_{\downarrow 4}$	$\mathbf{0.63}(0.1)^{\star 2}_{\downarrow 3}$	$\mathbf{0.74}(0.3)^{\star}_{\downarrow 2}$	15/15
SNES	11(9)	33(36)	∞	∞	∞	∞ *5e4*	0/15
xNES	1.0(0.4)	$0.50(0.1)_{\downarrow 4}$	$0.52(0.1)_{\downarrow 4}$	$0.73(0.1)_{\downarrow 2}$	1.0(0.2)	1.6(0.2)	15/15
xNESas	1.00(0.4)	$0.48(0.1)_{\downarrow 4}$	$0.48(0.1)_{\downarrow 4}$	$0.69(0.2)_{\downarrow 2}$	0.96(0.2)	1.1(0.2)	15/15

Table 80: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{119}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f119	12	657	1136	10372	35296	49747	15/15
IPOPsaACM	4.9(10)	1.1(2)	0.99(0.9)	**0.50**(0.5)	**0.47**(0.2)$_{\downarrow 2}$	**0.61**(0.5)$^{\star 2}$	15/15
SNES	3.9(6)	0.64(0.9)	**0.64**(0.5)	0.84(0.9)	∞	∞ *5e4*	0/15
xNES	**1.9**(2)	**0.38**(0.4)	0.66(0.2)	2.6(3)	1.5(1)	12(13)	9/15
xNESas	3.8(4)	2.1(1)	6.3(13)	1.6(2)	2.3(3)	5.9(6)	15/15

Table 81: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{120}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f120	16	2900	18698	72438	3.3e5	5.5e5	15/15
IPOPsaACM	26(56)	1.1(1)	**0.80**(0.5)*	**0.52**(0.3)$^{\star 4}$	**0.36**(0.3)$_{\downarrow 3}$	**0.64**(0.5)	15/15
SNES	12(32)	**0.72**(0.9)	38(42)	∞	∞	∞ *5e4*	0/15
xNES	**9.0**(12)	14(17)	43(42)	∞	∞	∞ *8e5*	0/15
xNESas	51(18)	13(21)	25(34)	∞	∞	∞ *1e6*	0/15

Table 82: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{121}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f121	8.6	111	273	1583	3870	6195	15/15
IPOPsaACM	3.3(4)	0.98(0.5)	0.97(0.5)	**1.0**(0.6)	**0.95**(0.4)	**0.86**(0.2)	15/15
SNES	**2.6**(3)	1.1(0.8)	**0.77**(0.4)	11(14)	∞	∞ *5e4*	0/15
xNES	2.7(3)	0.96(0.5)	1.2(0.2)	1.3(0.5)	1.2(1)	1.7(2)	15/15
xNESas	2.6(2)	**0.85**(0.6)	0.96(0.5)	1.6(0.8)	1.5(2)	2.3(3)	15/15

Table 83: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{122}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f122	10	1727	9190	30087	53743	1.1e5	15/15
IPOPsaACM	2.6(3)	1.2(0.8)	**0.75**(0.5)	**0.58**(0.2)$_{\downarrow}^{\star 4}$	**0.77**(0.3)$^{\star 4}$	**0.66**(0.3)$_{\downarrow}$	15/15
SNES	7.8(10)	**0.65**(0.6)	2.3(3)	∞	∞	∞ *5e4*	0/15
xNES	**1.7**(2)	1.9(2)	6.4(4)	200(214)	∞	∞ *8e5*	0/15
xNESas	5.0(4)	5.5(11)	8.9(8)	583(644)	∞	∞ *1e6*	0/15

Table 84: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{123}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f123	11	16066	81505	3.4e5	6.7e5	2.2e6	15/15
IPOPsaACM	23(52)	**0.74**(0.4)	**0.70**(0.5)	**0.58**(0.3)	**0.80**(0.7)	**0.71**(0.5)	15/15
SNES	12(16)	3.1(3)	∞	∞	∞	∞ *5e4*	0/15
xNES	36(70)	10(9)	∞	∞	∞	∞ *8e5*	0/15
xNESas	**6.6**(9)	7.2(7)	∞	∞	∞	∞ *1e6*	0/15

Table 85: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{124}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f124	10	202	1040	20478	45337	95200	15/15
IPOPsaACM	2.6(2)	1.3(0.6)	3.1(4)	**0.85**(0.7)	**0.97**(0.8)$^{\star 3}$	**4.1**(8)	15/15
SNES	2.9(4)	1.2(1.0)	**1.2**(0.9)	∞	∞	∞ *5e4*	0/15
xNES	**2.5**(2)	1.4(0.4)	3.8(10)	2.0(2)	19(21)	112(125)	1/15
xNESas	2.9(3)	**1.2**(0.5)	2.0(0.7)	1.1(1)	36(37)	60(67)	1/15

Table 86: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{125}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f125	1	1	1	2.4e5	2.4e5	2.5e5	15/15
IPOPsaACM	1.5(0)	**18**(18)	4308(4084)	**0.56**(0.6)	**0.79**(0.9)	**4.8**(6)	15/15
SNES	1.2(0.5)	33(34)	**3958**(3495)	∞	∞	∞ *5e4*	0/15
xNES	**1.1**(0)	29(26)	9476(1e4)	∞	∞	∞ *8e5*	0/15
xNESas	1.3(0.5)	23(22)	7786(7916)	∞	∞	∞ *1e6*	0/15

Table 87: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{126}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f126	1	1	1	∞	∞	∞	0
IPOPsaACM	**1**(0)	165(444)	**9361**(8720)	**1.3e7**(1e7)	**1.3e7**(1e7)	**1.3e7**(1e7)	5/15
SNES	1.4(1)	**32**(50)	5.2e4(5e4)	.	.	.	0/15
xNES	1.1(0)	88(191)	4.4e4(5e4)	.	.	.	0/15
xNESas	1.1(0.5)	44(88)	4.2e4(5e4)	.	.	.	0/15

Table 88: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{127}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f127	1	1	1	3.4e5	3.9e5	4.0e5	15/15
IPOPsaACM	**1**(0)	20(22)	**2432**(3044)	**0.30**(0.3)	**0.32**(0.3)$_{\downarrow}$	**0.33**(0.3)$_{\downarrow}$	15/15
SNES	1.1(0.5)	**19**(16)	3060(2752)	∞	∞	∞ *5e4*	0/15
xNES	1.1(0)	19(22)	3395(5420)	31(36)	∞	∞ *7e5*	0/15
xNESas	1.1(0.5)	20(16)	3858(5345)	∞	∞	∞ *1e6*	0/15

Table 89: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{128}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f128	111	4248	7808	12447	17217	21162	15/15
IPOPsaACM	**1.3**(1.0)	16(21)	265(321)	203(342)	147(247)	124(148)	11/15
SNES	1.6(2)	**1.1**(1)	**0.78**(0.8)	**0.51**(0.5)	**0.40**(0.3)$_{\downarrow 2}$	**0.45**(0.4)$_{\downarrow 2}$	15/15
xNES	7.1(2)	7.3(11)	5.2(6)	3.3(4)	2.4(3)	2.0(2)	15/15
xNESas	22(67)	6.2(9)	5.7(7)	3.6(4)	2.6(3)	2.1(2)	15/15

Table 90: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{129}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f129	64	10710	59443	2.8e5	5.1e5	5.8e5	15/15
IPOPsaACM	9.1(12)	10(21)	19(42)	13(18)	**7.1**(10)	**6.3**(9)	9/15
SNES	**7.6**(14)	**1.2**(1)	**1.8**(2)	∞	∞	∞ *5e4*	0/15
xNES	38(34)	15(10)	10(8)	**11**(13)	∞	∞ *7e5*	0/15
xNESas	17(16)	11(11)	8.6(11)	14(16)	∞	∞ *1e6*	0/15

Table 91: 05-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{130}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f130	55	812	3034	32823	33889	34528	10/15
IPOPsaACM	**1.4**(0.9)	27(27)	126(131)	42(76)	41(74)	40(72)	13/15
SNES	2.9(7)	**4.8**(5)	**1.6**(2)	**0.19**(0.2)	**0.44**(0.4)	2.7(2)	3/15
xNES	13(1)	67(84)	25(25)	2.4(2)	2.3(2)	**2.3**(2)	15/15
xNESas	17(0.9)	67(79)	28(48)	2.6(4)	2.5(4)	2.5(4)	15/15

Table 92: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{101}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f101	26	40	181	194	210	226	15/15
IPOPsaACM	3.7(2)	**4.1**(1)$^{\star 2}$	**1.1**(0.3)$^{\star 3}$	**1.4**(0.3)$^{\star 4}$	**1.6**(0.4)$^{\star 4}$	**1.8**(0.2)$^{\star 4}$	15/15
SNES	3.6(2)	5.9(1)	2.4(0.4)	4.4(0.4)	6.2(0.5)	7.7(0.3)	15/15
xNES	3.6(0.7)	11(2)	6.6(1)	13(0.8)	19(0.7)	24(0.7)	15/15
xNESas	**3.4**(2)	10(2)	4.4(1)	7.4(2)	9.1(2)	10(2)	15/15

Table 93: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{102}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f102	26	41	197	226	265	304	15/15
IPOPsaACM	4.7(2)	**4.9**(2)	**1.2**(0.3)$^{\star 3}$	**1.4**(0.3)$^{\star 4}$	**1.5**(0.3)$^{\star 4}$	**1.5**(0.3)$^{\star 4}$	15/15
SNES	3.9(2)	6.0(1.0)	2.3(0.3)	3.8(0.3)	4.9(0.4)	5.7(0.3)	15/15
xNES	**3.3**(1)	11(4)	5.9(0.7)	12(1.0)	15(0.8)	18(0.4)	15/15
xNESas	3.6(1)	10(2)	4.3(0.9)	7.1(2)	8.2(2)	8.5(2)	15/15

Table 94: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{103}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f103	26	47	126	360	363	364	15/15
IPOPsaACM	4.4(2)	**3.7**(0.8)$^{\star 2}$	**1.7**(0.3)$^{\star 4}$	**0.95**(0.3)$^{\star 4}$	**1.5**(0.3)$^{\star 4}$	**2.2**(0.5)$^{\star 4}$	15/15
SNES	4.1(0.9)	5.0(0.9)	3.6(0.2)	2.5(0.2)	5.1(2)	13(10)	15/15
xNES	**3.0**(0.9)	8.9(4)	9.3(0.7)	7.5(0.5)	12(0.4)	17(1.0)	15/15
xNESas	3.9(1)	9.1(2)	6.6(1)	4.2(1)	7.1(2)	11(2)	15/15

Table 95: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{104}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f104	610	9987	16641	19364	20764	22011	15/15
IPOPsaACM	**0.58**(0.2)$^{\star 3}_{\downarrow 3}$	**1.2**(0.8)	**0.81**(0.4)	**0.71**(0.4)	**0.67**(0.4)	**0.63**(0.3)	15/15
SNES	1.9(2)	7.6(9)	11(12)	∞	∞	∞ *1e5*	0/15
xNES	3.1(0.2)	4.7(6)	3.4(4)	3.4(3)	3.2(3)	3.1(3)	15/15
xNESas	2.4(0.5)	16(17)	15(19)	13(17)	12(15)	11(15)	15/15

Table 96: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{105}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f105	950	21491	70146	74217	78195	79729	15/15
IPOPsaACM	**0.58**(0.1)$^{\star 2}_{\downarrow 3}$	**1.3**(0.6)$^{\star 2}$	**0.40**(0.2)$^{\star 2}_{\downarrow 2}$	**0.39**(0.2)$^{\star 2}_{\downarrow 3}$	**0.37**(0.2)$^{\star 2}_{\downarrow 3}$	**0.37**(0.2)$^{\star 2}_{\downarrow 3}$	15/15
SNES	0.90(0.2)	6.4(6)	21(24)	∞	∞	∞ *1e5*	0/15
xNES	1.9(0.3)	35(35)	44(49)	69(59)	65(57)	64(55)	7/15
xNESas	1.4(0.2)	80(120)	84(105)	80(99)	75(94)	74(94)	8/15

Table 97: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{106}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f106	288	3425	7705	8501	8968	9372	15/15
IPOPsaACM	**1.1**(0.3)$^{\star 4}$	**0.34**(0.1)$^{\star 4}$	**0.20**(0.0)$^{\star 4}_{\downarrow 4}$	**0.25**(0.1)$^{\star 4}_{\downarrow 4}$	**0.28**(0.1)$^{\star 4}_{\downarrow 4}$	**0.30**(0.1)$^{\star 4}_{\downarrow 4}$	15/15
SNES	2.4(0.3)	22(26)	29(28)	∞	∞	∞ *1e5*	0/15
xNES	5.9(0.4)	1.5(0.3)	0.88(0.2)	0.94(0.2)	1.0(0.2)	1.2(0.2)	15/15
xNESas	5.0(1)	1.6(0.4)	0.97(0.3)	1.1(0.4)	1.1(0.4)	1.2(0.4)	15/15

Table 98: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{107}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f107	945	2255	3871	7352	11340	14303	15/15
IPOPsaACM	0.97(1)	1.1(0.8)	1.2(0.8)	**1.1**(0.4)	**1.00**(0.2)	**0.92**(0.2)	15/15
SNES	1.2(1)	1.1(0.6)	**0.92**(0.6)	1.4(2)	1.3(1)	2.4(2)	13/15
xNES	**0.58**(0.4)	**0.86**(0.4)	6.0(6)	10(8)	27(28)	95(137)	5/15
xNESas	0.79(0.7)	1.1(0.7)	1.9(0.5)	13(17)	33(50)	38(39)	15/15

Table 99: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{108}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f108	10015	31433	47589	1.1e5	1.8e5	3.1e5	15/15
IPOPsaACM	**0.90**(1)	**0.79**(0.4)$^{\star 4}$	**1.1**(0.5)$^{\star 4}$	**1.1**(0.6)	**1.2**(0.6)	**0.84**(0.3)	15/15
SNES	3.0(3)	∞	∞	∞	∞	∞ *1e5*	0/15
xNES	14(15)	∞	∞	∞	∞	∞ *2e6*	0/15
xNESas	8.8(11)	2334(2545)	∞	∞	∞	∞ *5e6*	0/15

Table 100: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{109}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f109	28	286	499	1159	1786	2415	15/15
IPOPsaACM	3.9(2)	**0.73**(0.2)$_{\downarrow 2}$	**0.91**(0.3)	**1.0**(0.2)$^{\star 2}$	**1.1**(0.3)$^{\star 3}$	**1.1**(0.3)$^{\star 4}$	15/15
SNES	3.9(1)	0.90(0.2)	1.1(0.2)	2.8(2)	15(20)	296(312)	0/15
xNES	3.6(1)	1.5(0.5)	3.1(0.6)	4.0(0.3)	4.6(0.3)	4.8(0.3)	15/15
xNESas	**3.1**(0.9)	1.7(0.4)	2.9(1)	4.0(0.3)	4.4(0.4)	4.6(0.3)	15/15

Table 101: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{110}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f110	11224	3.3e7	7.0e7	∞	∞	∞	0
IPOPsaACM	**0.77**(0.5)	∞	∞	.	.	.	0/15
SNES	1.5(2)	**0.01**(0.0)	**0.02**(0.0)	.	.	.	0/15
xNES	3.3(7)	1.1(1)	∞	.	.	.	0/15
xNESas	4.1(4)	∞	∞	.	.	.	0/15

Table 102: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{111}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f111	82927	∞	∞	∞	∞	∞	0
IPOPsaACM	**0.85**(0.5)$^{\star 4}$	.	.	.	.	.	0/15
SNES	∞	.	.	.	.	.	0/15
xNES	∞	.	.	.	.	.	0/15
xNESas	∞	.	.	.	.	.	0/15

Table 103: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{112}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f112	884	11583	16109	18239	19461	20444	15/15
IPOPsaACM	**0.43**(0.1)$^{\star 3}_{\downarrow 3}$	**0.92**(0.3)	**0.92**(0.2)*	**0.99**(0.2)$^{\star 3}$	**1.00**(0.2)$^{\star 3}$	**0.99**(0.2)$^{\star 3}$	15/15
SNES	1.2(1)	3.6(4)	15(17)	∞	∞	∞ *1e5*	0/15
xNES	2.0(0.2)	1.7(2)	6.7(6)	26(21)	54(68)	53(63)	13/15
xNESas	1.5(0.3)	3.0(3)	10(14)	65(67)	87(100)	185(215)	11/15

Table 104: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{113}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f113	4469	27633	1.0e5	1.1e5	1.1e5	1.1e5	15/15
IPOPsaACM	0.71(0.7)	0.67(0.5)	**0.28**(0.2)$_{\downarrow 2}$	**0.29**(0.1)$^{\star}_{\downarrow 2}$	**0.29**(0.1)$^{\star}_{\downarrow 2}$	**0.30**(0.1)$^{\star}_{\downarrow 3}$	15/15
SNES	0.62(0.5)	2.1(3)	4.4(5)	∞	∞	∞ *1e5*	0/15
xNES	**0.38**(0.5)	1.7(2)	1.8(2)	5.7(6)	5.7(6)	5.7(6)	14/15
xNESas	0.83(0.4)	**0.63**(1.0)	0.63(0.8)	4.8(7)	4.8(7)	5.2(8)	15/15

Table 105: 10-D, running time excess ERT/$\mathrm{ERT}_{\text{best 2009}}$ on f_{114}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f114	36612	1.3e5	3.3e5	3.9e5	3.9e5	4.1e5	15/15
IPOPsaACM	$\mathbf{0.59}$(0.4)*	$\mathbf{0.49}$(0.3)$^{\star 3}_{\downarrow}$	$\mathbf{0.35}$(0.2)$_{\downarrow 2}$	$\mathbf{0.41}$(0.2)$_{\downarrow 2}$	$\mathbf{0.41}$(0.2)$_{\downarrow 2}$	$\mathbf{0.41}$(0.2)$_{\downarrow 2}$	15/15
SNES	19(21)	∞	∞	∞	∞	∞ *1e5*	0/15
xNES	18(23)	262(264)	∞	∞	∞	∞ *2e6*	0/15
xNESas	14(15)	∞	∞	∞	∞	∞ *5e6*	0/15

Table 106: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{115}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f115	398	2899	8595	12602	12602	12807	15/15
IPOPsaACM	**0.70**(0.3)	0.70(0.5)	0.65(0.6)	0.95(0.4)	0.95(0.4)	0.95(0.4)	15/15
SNES	1.4(1)	3.0(3)	24(27)	∞	∞	∞ *1e5*	0/15
xNES	0.98(0.3)	0.45(0.1)	0.63(0.0)	1.3(2)	1.3(2)	1.6(2)	15/15
xNESas	0.87(0.3)	**0.44**(0.1)	**0.60**(1)	**0.62**(0.8)	**0.62**(0.8)	**0.80**(0.8)	15/15

Table 107: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{116}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f116	71444	1.1e5	1.1e5	1.2e5	1.2e5	1.7e5	15/15
IPOPsaACM	**0.53**(0.3)	**0.48**(0.3)	**0.49**(0.3)*	**0.50**(0.3)$^{\star 3}$	**0.50**(0.3)$^{\star 4}$	**0.39**(0.3)$_{\downarrow}^{\star 4}$	15/15
SNES	21(23)	∞	∞	∞	∞	∞ *1e5*	0/15
xNES	0.87(0.9)	2.0(1)	2.9(4)	6.2(8)	30(28)	111(117)	2/15
xNESas	1.1(2)	1.6(2)	3.0(3)	14(16)	29(28)	55(49)	5/15

Table 108: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{117}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f117	2.3e5	4.0e5	4.9e5	6.5e5	7.2e5	7.9e5	15/15
IPOPsaACM	**0.42**(0.2)$^{\star 4}_{\downarrow 3}$	**0.37**(0.2)$_{\downarrow 3}$	**0.33**(0.2)$_{\downarrow 3}$	**0.31**(0.1)$_{\downarrow 3}$	**0.34**(0.1)$_{\downarrow 3}$	**0.40**(0.2)$_{\downarrow 3}$	15/15
SNES	∞	∞	∞	∞	∞	∞ *1e5*	0/15
xNES	∞	∞	∞	∞	∞	∞ *2e6*	0/15
xNESas	∞	∞	∞	∞	∞	∞ *5e6*	0/15

Table 109: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{118}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f118	1348	3241	4345	6097	7070	8063	15/15
IPOPsaACM	$\mathbf{0.44}$(0.1)$^{\star 4}_{\downarrow 4}$	$\mathbf{0.37}$(0.2)$^{\star}_{\downarrow 3}$	$\mathbf{0.49}$(0.2)$_{\downarrow 3}$	$\mathbf{0.53}$(0.2)$^{\star 4}_{\downarrow 4}$	$\mathbf{0.58}$(0.2)$^{\star 4}_{\downarrow 4}$	$\mathbf{0.62}$(0.1)$^{\star 4}_{\downarrow 4}$	15/15
SNES	93(106)	∞	∞	∞	∞	∞ *1e5*	0/15
xNES	1.2(0.1)	0.70(0.1)$_{\downarrow 2}$	0.76(0.0)	1.1(0.1)	1.4(0.1)	1.7(0.1)	15/15
xNESas	1.1(0.2)	0.62(0.1)$_{\downarrow 4}$	0.66(0.1)$_{\downarrow 3}$	1.0(0.2)	1.3(0.2)	1.6(0.2)	15/15

Table 110: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{119}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f119	128	3122	4969	36536	3.0e5	4.0e5	15/15
IPOPsaACM	**1.5**(1)	**1.3**(1)	**1.1**(0.6)	**0.69**(0.5)$^{\star 3}$	**0.28**(0.0)$^{\star 4}_{\downarrow 4}$	**0.25**(0.0)$^{\star 4}_{\downarrow 4}$	15/15
SNES	1.9(1)	1.5(2)	2.3(2)	∞	∞	∞ *1e5*	0/15
xNES	1.7(1)	2.4(5)	4.3(6)	19(21)	∞	∞ *3e6*	0/15
xNESas	1.5(1)	2.1(0.6)	7.4(8)	15(14)	33(34)	∞ *5e6*	0/15

Table 111: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{120}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f120	471	39910	74629	4.4e5	1.3e6	2.5e6	15/15
IPOPsaACM	4.3(5)	**0.66**(0.8)$^{\star 2}$	**0.90**(0.4)$^{\star 3}$	**0.51**(0.3)$_{\downarrow 2}$	**0.50**(0.3)$_{\downarrow 2}$	**0.47**(0.2)$_{\downarrow 2}$	15/15
SNES	5.3(5)	11(13)	∞	∞	∞	∞ *1e5*	0/15
xNES	**3.8**(4)	53(46)	∞	∞	∞	∞ *2e6*	0/15
xNESas	31(32)	65(57)	∞	∞	∞	∞ *5e6*	0/15

Table 112: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{121}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f121	72	317	631	3676	9995	18211	15/15
IPOPsaACM	1.1(0.8)	0.98(0.4)	1.1(0.4)	**0.76**(0.2)$^{\star 4}_{\downarrow 2}$	**0.76**(0.1)$^{\star 3}_{\downarrow 3}$	**0.72**(0.1)$^{\star 2}_{\downarrow 4}$	15/15
SNES	**0.76**(0.6)	**0.79**(0.3)	**1.0**(0.2)	94(98)	∞	∞ *1e5*	0/15
xNES	0.90(0.6)	1.2(0.6)	2.7(0.5)	1.6(0.2)	1.1(0.3)	0.90(0.2)	15/15
xNESas	0.98(0.6)	1.0(0.4)	2.5(0.4)	1.6(0.2)	1.0(0.1)	0.83(0.1)$_{\downarrow 2}$	15/15

Table 113: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{122}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f122	55	11563	33165	1.4e5	4.4e5	8.2e5	15/15
IPOPsaACM	8.0(8)	**0.74**(0.5)	**0.72**(0.4)$^{\star 4}$	**0.68**(0.5)$^{\star 4}$	**0.51**(0.4)	**0.81**(0.6)	15/15
SNES	5.2(9)	2.0(2)	∞	∞	∞	∞ *1e5*	0/15
xNES	3.1(3)	8.8(12)	511(540)	∞	∞	∞ *2e6*	0/15
xNESas	**2.7**(4)	7.7(9)	1066(1112)	∞	∞	∞ *5e6*	0/15

Table 114: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{123}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f123	40	94387	3.9e5	1.3e6	3.3e6	1.0e7	7/15
IPOPsaACM	**20**(30)	**0.84**(0.6)$^{\star 3}$	**0.64**(0.3)	**0.64**(0.4)	**0.79**(0.5)	**0.79**(0.6)	11/15
SNES	39(80)	∞	∞	∞	∞	∞ *1e5*	0/15
xNES	95(72)	∞	∞	∞	∞	∞ *2e6*	0/15
xNESas	20(27)	786(927)	∞	∞	∞	∞ *5e6*	0/15

Table 115: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{124}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f124	37	614	10452	52887	1.4e5	3.3e5	15/15
IPOPsaACM	2.1(1)	**1.2**(0.7)	1.4(3)	1.2(0.9)	**1.2**(1)	**3.3**(7)	15/15
SNES	1.5(2)	1.2(1)	0.96(0.8)	∞	∞	∞ *1e5*	0/15
xNES	**1.2**(1)	1.4(0.4)	**0.42**(0.1)	1.7(2)	∞	∞ *2e6*	0/15
xNESas	1.5(1)	1.4(0.5)	0.42(0.0)	**1.2**(1)	39(42)	∞ *5e6*	0/15

Table 116: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{125}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f125	1	1	1	3.0e6	6.4e6	6.4e6	13/15
IPOPsaACM	**1**(0)	118(110)	**2.3e5**(2e5)	**0.75**(0.6)	**0.45**(0.4)	**1.0**(0.9)	11/15
SNES	1.1(0.5)	124(83)	1.5e6(2e6)	∞	∞	∞ *1e5*	0/15
xNES	1.2(0.5)	**73**(92)	∞	∞	∞	∞ *2e6*	0/15
xNESas	1.1(0)	91(70)	∞	∞	∞	∞ *5e6*	0/15

Table 117: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{126}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f126	1	1	1	∞	∞	∞	0
IPOPsaACM	**1**(0)	1077(1074)	**3.6e6**(2e6)	.	.	.	0/15
SNES	1.2(0.5)	1083(1304)	∞	.	.	.	0/15
xNES	1.2(0.5)	**432**(376)	∞	.	.	.	0/15
xNESas	1.3(0.5)	2529(444)	∞	.	.	.	0/15

Table 118: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{127}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f127	1	1	1	1.3e6	2.1e6	2.1e6	15/15
IPOPsaACM	**1**(0)	76(36)	**4.1e4**(3e4)$^{\star 3}$	**0.67**(0.6)	**0.59**(0.5)	**0.91**(1)	15/15
SNES	**1**(0)	56(49)	∞	∞	∞	∞ *1e5*	0/15
xNES	**1**(0)	**38**(31)	5.9e6(6e6)	∞	∞	∞ *2e6*	0/15
xNESas	1.3(0.5)	51(38)	1.9e6(3e6)	∞	∞	∞ *5e6*	0/15

Table 119: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{128}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f128	9151	1.4e5	1.4e5	2.9e5	3.8e5	5.3e5	9/15
IPOPsaACM	1.2(2)	16(36)	23(36)	15(19)	19(26)	14(19)	10/15
SNES	**0.53**(0.8)	**0.20**(0.4)	**0.21**(0.4)	**0.10**(0.2)	**0.10**(0.1)$_{\downarrow 2}$	**0.09**(0.1)	12/15
xNES	2.7(5)	1.7(2)	1.7(2)	0.81(1.0)	0.84(0.8)	0.65(0.6)	14/15
xNESas	1.1(2)	0.98(0.7)	2.1(3)	1.4(3)	1.3(2)	0.94(2)	15/15

Table 120: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{129}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f129	53967	1.4e6	1.4e6	1.4e6	1.4e6	1.5e6	14/15
IPOPsaACM	**0.68**(0.8)	**4.4**(7)	**4.3**(7)	**4.3**(7)	**4.3**(7)	**4.3**(7)	10/15
SNES	1.9(2)	∞	∞	∞	∞	∞ *1e5*	0/15
xNES	5.7(5)	∞	∞	∞	∞	∞ *2e6*	0/15
xNESas	6.0(5)	54(57)	∞	∞	∞	∞ *5e6*	0/15

Table 121: 10-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{130}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f130	481	5878	37470	70910	72192	73340	10/15
IPOPsaACM	5.3(8)	240(551)	67(134)	35(71)	35(69)	34(68)	13/15
SNES	**2.0**(3)	**3.0**(4)	**0.68**(1)	**0.43**(0.7)	**1.1**(1)	4.2(5)	3/15
xNES	11(0.4)	36(39)	7.8(9)	4.1(5)	4.1(5)	4.1(5)	15/15
xNESas	10(21)	34(37)	6.7(7)	3.6(3)	3.5(3)	**3.5**(3)	15/15

Table 122: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{101}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f101	59	425	571	700	739	783	15/15
IPOPsaACM	4.7(1)	**0.86**(0.2)$^{\star 4}$	**0.73**(0.1)$^{\star 4}_{\downarrow 2}$	**0.78**(0.1)$^{\star 4}_{\downarrow 3}$	**0.88**(0.1)$^{\star 4}_{\downarrow}$	**0.99**(0.1)$^{\star 4}$	15/15
SNES	**4.1**(0.7)	1.5(0.2)	1.9(0.1)	2.8(0.2)	3.9(0.1)	4.7(0.2)	15/15
xNES	5.5(2)	7.1(0.9)	10(0.7)	17(0.6)	24(0.4)	30(0.6)	15/15
xNESas	4.8(2)	5.1(0.8)	5.7(2)	6.7(2)	7.7(3)	8.4(2)	30/30

Table 123: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{102}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f102	231	399	579	921	1157	1407	15/15
IPOPsaACM	1.2(0.2)	**0.93**(0.2)$^{\star 3}$	**0.75**(0.1)$^{\star 4}_{\downarrow 3}$	**0.61**(0.1)$^{\star 4}_{\downarrow 4}$	**0.60**(0.0)$^{\star 4}_{\downarrow 4}$	**0.60**(0.0)$^{\star 4}_{\downarrow 4}$	15/15
SNES	**1.1**(0.2)	1.6(0.3)	1.9(0.1)	2.1(0.1)	2.5(0.1)	2.7(0.1)	15/15
xNES	1.5(0.7)	7.7(0.9)	10(0.5)	13(0.3)	15(0.2)	17(0.4)	15/15
xNESas	1.5(0.5)	5.8(2)	6.2(2)	5.6(2)	5.4(2)	5.4(2)	30/30

Table 124: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{103}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f103	65	417	629	1313	1893	2464	14/15
IPOPsaACM	3.9(0.8)	**0.83**(0.2)$^{\star 4}_{\downarrow 2}$	**0.66**(0.1)$^{\star 4}$	**0.52**(0.1)$^{\star 4}_{\downarrow 4}$	**0.55**(0.1)$^{\star 4}_{\downarrow 4}$	**0.58**(0.1)$^{\star 4}_{\downarrow 3}$	15/15
SNES	**3.8**(0.9)	1.5(0.2)	1.7(0.1)	1.6(0.1)	1.7(0.1)	3.4(2)	15/15
xNES	6.2(2)	7.4(0.8)	10(0.4)	9.4(0.3)	10(0.4)	11(0.3)	15/15
xNESas	5.0(2)	5.0(1)	4.9(2)	4.1(2)	5.5(2)	6.8(2)	30/30

Table 125: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{104}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f104	23690	85656	1.7e5	1.8e5	1.9e5	2.0e5	15/15
IPOPsaACM	**3.5**(2)	**1.1**(0.6)$^{\star 4}$	**0.55**(0.3)$^{\star 4}$	**0.52**(0.3)$^{\star 4}$	**0.50**(0.3)$^{\star 4}$	**0.49**(0.3)$^{\star 4}$	15/15
SNES	∞	∞	∞	∞	∞	∞ *2e5*	0/15
xNES	8.1(10)	∞	∞	∞	∞	∞ *8e6*	0/15
xNESas	24(29)	∞	∞	∞	∞	∞ *2e7*	0/30

Table 126: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{105}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f105	1.9e5	6.1e5	6.3e5	6.5e5	6.6e5	6.7e5	15/15
IPOPsaACM	**1.0**(0.4)$^{\star 2}$	**0.36**(0.1)$_{\downarrow 3}$	**0.35**(0.1)$_{\downarrow 3}$	**0.34**(0.1)$_{\downarrow 3}$	**0.34**(0.1)$_{\downarrow 3}$	**0.33**(0.1)$_{\downarrow 3}$	15/15
SNES	∞	∞	∞	∞	∞	∞ *2e5*	0/15
xNES	17(16)	∞	∞	∞	∞	∞ *7e6*	0/15
xNESas	24(33)	∞	∞	∞	∞	∞ *2e7*	0/21

Table 127: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{106}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f106	11480	21668	23746	25470	26492	27360	15/15
IPOPsaACM	**0.28**(0.1)$^{\star 4}_{\downarrow 4}$	**0.37**(0.3)$^{\star 4}_{\downarrow 4}$	**0.39**(0.2)$^{\star 4}_{\downarrow 4}$	**0.45**(0.2)$^{\star 4}_{\downarrow 4}$	**0.46**(0.2)$^{\star 4}_{\downarrow 4}$	**0.47**(0.2)$^{\star 4}_{\downarrow 4}$	15/15
SNES	123(138)	∞	∞	∞	∞	∞ *2e5*	0/15
xNES	1.3(0.1)	1.2(0.1)	1.3(0.1)	1.3(0.1)	1.5(0.1)	1.7(0.1)	15/15
xNESas	1.2(0.2)	1.4(0.3)	1.5(0.5)	1.7(0.9)	1.8(0.7)	2.0(0.7)	30/30

Table 128: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{107}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f107	8571	13582	16226	27357	52486	65052	15/15
IPOPsaACM	**0.83**(0.5)	**1.3**(0.8)$^{\star 3}$	**1.4**(0.7)$^{\star 4}$	**1.3**(0.8)$^{\star 4}$	**1.0**(0.5)$^{\star 4}$	**0.94**(0.4)$^{\star 4}$	15/15
SNES	2.6(3)	14(15)	∞	∞	∞	∞ *2e5*	0/15
xNES	1.7(0.4)	69(69)	879(893)	∞	∞	∞ *7e6*	0/15
xNESas	1.6(0.9)	44(41)	786(1027)	∞	∞	∞ *1e7*	0/15

Table 129: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{108}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f108	58063	97228	2.0e5	4.5e5	6.3e5	9.0e5	15/15
IPOPsaACM	**0.72**(0.3)$^{\star 4}$	**1.2**(0.6)$^{\star 4}$	**1.1**(0.6)	**1.2**(0.7)	**1.6**(0.3)	**1.4**(0.3)	15/15
SNES	∞	∞	∞	∞	∞	∞ *2e5*	0/15
xNES	∞	∞	∞	∞	∞	∞ *6e6*	0/15
xNESas	∞	∞	∞	∞	∞	∞ *1e7*	0/15

Table 130: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{109}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f109	333	632	1138	2287	3583	4952	15/15
IPOPsaACM	0.93(0.3)	**0.78**(0.2)$^{\star 2}_{\downarrow}$	**0.78**(0.2)$^{\star 3}_{\downarrow 2}$	**0.89**(0.3)$^{\star 4}$	**0.79**(0.2)$^{\star 4}_{\downarrow}$	**0.75**(0.2)$^{\star 4}_{\downarrow 2}$	15/15
SNES	**0.77**(0.1)$_{\downarrow 2}$	1.1(0.1)	1.3(0.2)	3.8(3)	15(13)	103(111)	3/15
xNES	0.94(0.3)	5.5(0.7)	7.7(0.4)	10(0.5)	10(0.5)	10(0.3)	15/15
xNESas	1.0(0.2)	4.7(0.6)	6.9(0.8)	9.4(0.7)	10(0.5)	13(8)	15/15

Table 131: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{110}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f110	∞	∞	∞	∞	∞	∞	0
IPOPsaACM	.	.	.	.	.	.	0/15
SNES	.	.	.	.	.	.	0/15
xNES	.	.	.	.	.	.	0/15
xNESas	.	.	.	.	.	.	0/15

Table 132: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{111}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f111	∞	∞	∞	∞	∞	∞	0
IPOPsaACM	.	.	.	.	.	.	0/15
SNES	.	.	.	.	.	.	0/15
xNES	.	.	.	.	.	.	0/15
xNESas	.	.	.	.	.	.	0/15

Table 133: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{112}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f112	25552	64124	69621	73557	76137	78238	15/15
IPOPsaACM	**0.89**(0.3)	**0.79**(0.1)$^{\star 4}$	**0.84**(0.1)$^{\star 4}$	**0.88**(0.1)$^{\star 4}$	**0.88**(0.1)$^{\star 4}$	**0.88**(0.1)$^{\star 4}$	15/15
SNES	113(122)	∞	∞	∞	∞	∞ *2e5*	0/15
xNES	0.93(0.2)	52(64)	1454(1519)	∞	∞	∞ *7e6*	0/15
xNESas	0.99(0.2)	59(67)	952(948)	3878(4383)	3747(3875)	3646(3690)	1/15

Table 134: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{113}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f113	50123	3.6e5	5.6e5	5.9e5	5.9e5	5.9e5	15/15
IPOPsaACM	**0.54**(0.2)	**0.35**(0.2)$^{\star 4}_{\downarrow 2}$	**0.31**(0.1)$^{\star 4}_{\downarrow 4}$	**0.32**(0.1)$^{\star 4}_{\downarrow 4}$	**0.32**(0.1)$^{\star 4}_{\downarrow 4}$	**0.32**(0.1)$^{\star 4}_{\downarrow 4}$	15/15
SNES	4.5(5)	∞	∞	∞	∞	∞ *2e5*	0/15
xNES	5.0(5)	137(150)	∞	∞	∞	∞ *7e6*	0/15
xNESas	1.4(1)	179(204)	∞	∞	∞	∞ *1e7*	0/15

Table 135: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{114}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f114	2.1e5	1.1e6	1.4e6	1.6e6	1.6e6	1.6e6	15/15
IPOPsaACM	**0.71**$_{(0.3)}^{\star 4}$	**0.39**$_{(0.3)\downarrow 3}$	**0.40**$_{(0.2)\downarrow 3}$	**0.50**$_{(0.3)\downarrow 2}$	**0.50**$_{(0.3)\downarrow 2}$	**0.55**$_{(0.3)\downarrow}$	15/15
SNES	∞	∞	∞	∞	∞	∞ *2e5*	0/15
xNES	∞	∞	∞	∞	∞	∞ *6e6*	0/15
xNESas	∞	∞	∞	∞	∞	∞ *1e7*	0/15

Table 136: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{115}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f115	2405	30268	91749	1.3e5	1.3e5	1.3e5	15/15
IPOPsaACM	**0.75**(2)	0.67(0.3)	0.31(0.2)	4.8(15)	4.8(15)	4.7(14)	15/15
SNES	1.2(1)	29(33)	∞	∞	∞	∞ *2e5*	0/15
xNES	1.0(0.2)	0.25(0.0)$_{\downarrow 4}$	0.14(9e-3)$_{\downarrow}$	0.62(0.8)	0.62(0.8)	0.69(0.8)	15/15
xNESas	1.0(0.1)	**0.24**(0.0)$_{\downarrow 4}$	**0.14**(0.0)$_{\downarrow}$	**0.37**(0.3)	**0.37**(0.3)	**0.46**(0.5)	15/15

Table 137: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{116}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f116	5.0e5	6.9e5	8.9e5	1.0e6	1.1e6	1.1e6	15/15
IPOPsaACM	**0.46**(0.1)	**0.35**(0.1)	**0.30**(0.1)	**0.28**(0.1)$_{\downarrow 4}$	**0.29**(0.1)$_{\downarrow 4}$	**0.30**(0.1)$_{\downarrow 4}$	15/15
SNES	∞	∞	∞	∞	∞	∞ *2e5*	0/15
xNES	101(116)	∞	∞	∞	∞	∞ *7e6*	0/15
xNESas	39(42)	∞	∞	∞	∞	∞ *2e7*	0/15

Table 138: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{117}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f117	1.8e6	2.5e6	2.6e6	2.9e6	3.2e6	3.6e6	15/15
IPOPsaACM	$\mathbf{0.29}_{(0.1)\downarrow 3}$	$\mathbf{0.26}_{(0.1)\downarrow 4}$	$\mathbf{0.29}_{(0.1)\downarrow 4}$	$\mathbf{0.35}_{(0.2)\downarrow 4}$	$\mathbf{0.42}_{(0.2)\downarrow 3}$	$\mathbf{0.48}_{(0.4)\downarrow 2}$	15/15
SNES	∞	∞	∞	∞	∞	∞ *2e5*	0/15
xNES	∞	∞	∞	∞	∞	∞ *5e6*	0/15
xNESas	∞	∞	∞	∞	∞	∞ *8e6*	0/30

Table 139: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{118}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f118	6908	11786	17514	26342	30062	32659	15/15
IPOPsaACM	**0.42**(0.2)$^{\star 4}_{\downarrow 4}$	**0.49**(0.1)$^{\star 3}_{\downarrow 4}$	**0.54**(0.1)$^{\star 3}_{\downarrow 3}$	**0.54**(0.2)$^{\star 4}_{\downarrow 4}$	**0.56**(0.1)$^{\star 4}_{\downarrow 4}$	**0.58**(0.1)$^{\star 4}_{\downarrow 4}$	15/15
SNES	∞	∞	∞	∞	∞	∞ *2e5*	0/15
xNES	1.0(0.0)	0.90(0.0)	0.90(0.0)	1.1(0.1)	1.5(0.1)	1.8(0.0)	15/15
xNESas	0.94(0.1)	0.77(0.1)	0.80(0.1)	1.1(0.1)	1.7(0.7)	2.1(0.7)	15/15

Table 140: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{119}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f119	2771	29365	35930	4.1e5	1.4e6	1.9e6	15/15
IPOPsaACM	1.5(2)	**0.74**(0.3)$^{\star 2}$	**0.88**(0.3)$^{\star 3}$	**0.33**(0.1)$^{\star 3}_{\downarrow 3}$	**0.25**(0.1)$_{\downarrow 4}$	**0.37**(0.3)$_{\downarrow 3}$	15/15
SNES	1.4(2)	22(24)	∞	∞	∞	∞ *2e5*	0/15
xNES	0.54(0.3)$_{\downarrow 2}$	14(13)	2741(3347)	∞	∞	∞ *7e6*	0/15
xNESas	**0.53**(0.4)$_{\downarrow}$	10(10)	851(808)	∞	∞	∞ *1e7*	0/13

Table 141: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{120}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f120	36040	1.8e5	2.8e5	1.6e6	6.7e6	1.4e7	13/15
IPOPsaACM	**0.65**(0.5)	**0.80**(0.4)$^{\star 4}$	**1.2**(0.6)	**0.87**(0.5)	**0.42**(0.1)$_{\downarrow 3}$	**0.39**(0.2)$_{\downarrow 3}$	15/15
SNES	10(11)	∞	∞	∞	∞	∞ *2e5*	0/15
xNES	14(23)	∞	∞	∞	∞	∞ *6e6*	0/15
xNESas	6.9(7)	∞	∞	∞	∞	∞ *1e7*	0/15

Table 142: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{121}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f121	249	769	1426	9304	34434	57404	15/15
IPOPsaACM	1.2(0.4)	**0.85**(0.2)	**0.92**(0.3)$^{\star 2}$	**0.69**(0.1)$^{\star 4}_{\downarrow 3}$	**0.58**(0.1)$^{\star 4}_{\downarrow 4}$	**0.71**(0.1)$^{\star 4}_{\downarrow 3}$	15/15
SNES	0.83(0.2)	0.89(0.2)	1.3(0.2)	∞	∞	∞ *2e5*	0/15
xNES	**0.74**(0.2)	3.4(0.6)	6.7(0.4)	2.9(0.2)	1.3(0.1)	1.1(0.1)	15/15
xNESas	0.81(0.3)	2.8(0.6)	6.3(0.5)	2.9(0.2)	1.7(0.6)	1.7(1)	15/15

Table 143: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{122}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f122	692	52008	1.4e5	7.9e5	2.0e6	5.8e6	15/15
IPOPsaACM	2.5(3)	**0.94**(0.6)$^{\star 3}$	**0.81**(0.3)$^{\star 3}$	**0.53**(0.1)$_{\downarrow}$	**0.51**(0.2)$_{\downarrow}$	**0.57**(0.3)	15/15
SNES	1.9(2)	∞	∞	∞	∞	∞ *2e5*	0/15
xNES	0.91(0.8)	∞	∞	∞	∞	∞ *6e6*	0/15
xNESas	**0.81**(0.9)	∞	∞	∞	∞	∞ *1e7*	0/13

Table 144: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{123}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f123	1063	5.3e5	1.5e6	5.3e6	2.7e7	1.6e8	0
IPOPsaACM	**7.6**(8)	**0.77**(0.5)	**0.81**(0.5)	**1.1**(0.7)	**0.63**(0.4)	**0.92**(1)	0/15
SNES	7.7(9)	∞	∞	∞	∞	∞ *2e5*	0/15
xNES	9.0(9)	∞	∞	∞	∞	∞ *6e6*	0/15
xNESas	11(14)	∞	∞	∞	∞	∞ *1e7*	0/15

Table 145: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{124}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f124	192	1959	40840	1.3e5	3.9e5	8.0e5	15/15
IPOPsaACM	0.86(0.4)	3.0(0.8)	2.2(2)	**1.4**(0.5)	**0.76**(0.3)	**4.0**(5)	14/15
SNES	**0.58**(0.4)$_{\downarrow}$	**0.69**(0.2)$_{\downarrow}$	0.66(0.5)	∞	∞	∞ *2e5*	0/15
xNES	0.63(0.3)	2.7(0.3)	**0.58**(0.1)	6.4(7)	∞	∞ *7e6*	0/15
xNESas	0.84(0.3)	2.7(0.5)	0.59(0.1)	4.0(3)	∞	∞ *2e7*	0/15

Table 146: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{125}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f125	1	1	1	2.5e7	8.0e7	8.1e7	4/15
IPOPsaACM	**1**(0)	1083(1766)	**3.3e6**(2e6)	**0.61**(0.5)	**1.1**(1)	**1.1**(1)	3/15
SNES	1.3(0.5)	625(509)	∞	∞	∞	∞ *2e5*	0/15
xNES	1.5(1)	**451**(271)	∞	∞	∞	∞ *6e6*	0/30
xNESas	1.7(1)	470(238)	∞	∞	∞	∞ *1e7*	0/15

Table 147: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{126}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f126	1	1	1	∞	∞	∞	0
IPOPsaACM	**1**(0)	**7156**(4580)	∞	.	.	.	0/15
SNES	1.3(0.5)	2.3e4(2e4)	∞	.	.	.	0/15
xNES	1.2(0.5)	2.5e4(6e4)	∞	.	.	.	0/30
xNESas	1.4(1)	2.7e4(5e4)	∞	.	.	.	0/15

Table 148: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{127}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f127	1	1	1	4.4e6	7.3e6	7.4e6	15/15
IPOPsaACM	**1**(0)	238(106)	**3.3e5**(4e5)	**0.75**(0.6)	**0.93**(0.5)	**0.97**(0.6)	14/15
SNES	1.2(0.5)	167(80)	∞	∞	∞	∞ *2e5*	0/15
xNES	1.4(1)	**128**(63)	∞	∞	∞	∞ *6e6*	0/30
xNESas	1.5(0.5)	131(87)	∞	∞	∞	∞ *1e7*	0/15

Table 149: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{128}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f128	1.4e5	1.3e7	1.7e7	1.7e7	1.7e7	1.7e7	9/15
IPOPsaACM	**1.3**(2)	0.59(0.8)	1.1(1)	1.1(2)	1.1(2)	**1.1**(1)	8/15
SNES	4.2(5)	∞	∞	∞	∞	∞ *2e5*	0/15
xNES	28(32)	0.97(0.9)	1.2(1)	2.0(2)	3.4(4)	3.4(4)	3/30
xNESas	19(23)	**0.40**(0.5)	**0.78**(0.8)	**1.0**(1)	**1.0**(1)	1.3(1)	6/15

Table 150: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{129}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f129	7.8e6	4.1e7	4.2e7	4.2e7	4.2e7	4.2e7	5/15
IPOPsaACM	**0.41**(0.9)	**0.28**(0.5)	**0.36**(0.5)	**0.36**(0.5)	**0.36**(0.5)	**0.36**(0.5)	9/15
SNES	∞	∞	∞	∞	∞	∞ *2e5*	0/15
xNES	∞	∞	∞	∞	∞	∞ *6e6*	0/30
xNESas	∞	∞	∞	∞	∞	∞ *1e7*	0/15

Table 151: 20-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{130}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f130	4904	93149	2.5e5	2.5e5	2.6e5	2.6e5	7/15
IPOPsaACM	**0.55**(1)	27(34)	30(42)	30(43)	30(41)	30(39)	12/15
SNES	0.76(1)	**0.19**(0.3)	**0.09**(0.1)	**0.11**(0.1)	**0.36**(0.3)	**2.1**(2)	2/15
xNES	14(20)	10(9)	4.9(5)	4.9(5)	4.9(5)	4.9(5)	29/30
xNESas	15(23)	5.3(4)	5.4(9)	5.4(9)	5.4(9)	5.4(9)	15/15

Table 152: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{101}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f101	584	905	1255	1913	2556	3237	15/15
SNES	**1.2**(0.2)$^{\star 5}$	**1.9**(0.1)$^{\star 5}$	**2.1**(0.1)$^{\star 5}$	**2.4**(0.1)$^{\star 5}$	**2.5**(0.1)$^{\star 5}$	**2.6**(0.0)$^{\star 5}$	15/15
xNESas	9.3(1)	16(3)	16(6)	14(9)	12(8)	10(6)	30/30

Table 153: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{102}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f102	821	1286	1742	2629	3557	4504	15/15
SNES	**0.94**(0.2)$^{\star 4}$	**1.3**(0.1)$^{\star 4}$	**1.5**(0.1)$^{\star 4}$	**1.8**(0.0)$^{\star 4}$	**1.8**(0.0)$^{\star 4}$	**1.9**(0.0)$^{\star 4}$	15/15
xNES	6.8(1)	14(0.6)	18(0.6)	22(0.2)	23(0.3)	24(0.2)	15/15
xNESas	6.9(1)	12(2)	12(4)	11(6)	10(7)	9.3(8)	30/30

Table 154: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{103}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f103	529	1223	1693	2720	3818	4963	15/15
SNES	**1.4**(0.1)$^{\star 4}$	**1.4**(0.1)$^{\star 4}$	**1.6**(0.1)$^{\star 4}$	**1.8**(0.1)$^{\star 4}$	**2.0**(0.0)$^{\star 4}$	**4.3**(2)$^{\star 4}$	15/15
xNES	11(1)	15(0.7)	18(0.4)	22(0.3)	24(0.4)	25(0.3)	15/15
xNESas	10(2)	12(3)	12(5)	13(8)	19(13)	24(13)	30/30

Table 155: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{104}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f104	3.1e6	3.6e6	3.7e6	3.7e6	3.7e6	3.8e6	15/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15
xNES	∞	∞	∞	∞	∞	∞ *1e7*	0/1
xNESas	∞	∞	∞	∞	∞	∞ *3e7*	0/30

Table 156: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{105}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f105	5.6e6	5.9e6	6.0e6	6.1e6	6.2e6	6.3e6	15/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15
xNESas	∞	∞	∞	∞	∞	∞ *2e7*	0/19

Table 157: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{106}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f106	69253	90821	95524	99526	1.0e5	1.0e5	15/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15
xNESas	**1.4**$_{(0.1)}{}^{\star 4}$	**1.6**$_{(0.1)}{}^{\star 4}$	**1.6**$_{(0.1)}{}^{\star 4}$	**1.7**$_{(0.1)}{}^{\star 4}$	**2.0**$_{(0.8)}{}^{\star 4}$	**3.0**$_{(1)}{}^{\star 4}$	15/15

Table 158: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{107}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f107	38382	57745	74911	97700	1.2e5	1.4e5	15/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15
xNES	∞	∞	∞	∞	∞	∞ *9e6*	0/2
xNESas	∞	∞	∞	∞	∞	∞ *2e7*	0/27

Table 159: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{108}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f108	2.1e5	5.6e5	9.4e5	1.8e6	2.8e6	4.3e6	15/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15
xNESas	∞	∞	∞	∞	∞	∞ *2e7*	0/15

Table 160: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{109}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f109	841	1456	2504	4958	7525	10054	15/15
SNES	**0.92**(0.1)$^{\star 4}$	**1.4**(0.1)$^{\star 4}$	**1.6**(0.1)$^{\star 4}$	**3.4**(2)$^{\star 4}$	**18**(24)	129(139)	1/15
xNESas	6.6(1)	15(2)	19(1)	23(0.7)	30(11)	**32**(10)	15/15

Table 161: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{110}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f110	∞	∞	∞	∞	∞	∞	0
SNES	.	.	.	.	.	.	0/15
xNESas	.	.	.	.	.	.	0/15

Table 162: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{111}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f111	∞	∞	∞	∞	∞	∞	0
SNES	.	.	.	.	.	.	0/15
xNESas	.	.	.	.	.	.	0/3

Table 163: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{112}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f112	1.8e5	2.5e5	2.7e5	2.8e5	2.8e5	2.9e5	14/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15

Table 164: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{113}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f113	4.4e5	2.5e6	2.7e6	3.0e6	3.0e6	3.0e6	15/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15
xNES	∞	∞	∞	∞	∞	∞ *2e7*	0/1
xNESas	∞	∞	∞	∞	∞	∞ *3e7*	0/15

Table 165: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{114}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f114	1.7e6	6.5e6	1.0e7	1.2e7	1.2e7	1.2e7	15/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15
xNESas	∞	∞	∞	∞	∞	∞ *2e7*	0/15

Table 166: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{115}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f115	20541	1.9e5	3.7e5	4.2e5	4.2e5	4.2e5	15/15
SNES	0.93(1)	∞	∞	∞	∞	∞ *4e5*	0/15
xNESas	**0.92**(0.1)	**0.21**(9e-3)$^{\star 4}$	**0.24**(0.0)$^{\star 4}$	**0.96**(0.7)$^{\star 4}$	**0.96**(0.7)$^{\star 4}$	**0.96**(0.7)	15/15

Table 167: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{116}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f116	4.2e6	4.3e6	4.5e6	4.8e6	5.1e6	5.4e6	15/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15
xNESas	∞	∞	∞	∞	∞	∞ *3e7*	0/15

Table 168: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{117}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f117	8.4e6	1.2e7	1.4e7	1.7e7	1.9e7	2.1e7	15/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15
xNESas	∞	∞	∞	∞	∞	∞ *2e7*	0/7

Table 169: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{118}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f118	39183	47888	81836	1.1e5	1.2e5	1.3e5	15/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15

Table 170: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{119}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f119	42381	1.2e5	1.6e5	2.1e6	1.0e7	1.3e7	15/15
SNES	31(34)	∞	∞	∞	∞	∞ *4e5*	0/15
xNES	7.4(1e-3)	∞	∞	∞	∞	∞ *1e7*	0/2
xNESas	**3.6**(3)	∞	∞	∞	∞	∞ *3e7*	0/15

Table 171: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{120}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f120	1.6e5	7.1e5	1.7e6	1.1e7	4.3e7	2.4e8	3/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15
xNESas	∞	∞	∞	∞	∞	∞ *2e7*	0/15

Table 172: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{121}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f121	728	1739	3362	27554	97381	2.0e5	14/15
SNES	**0.77**(0.2)	**1.1**(0.1)$^{\star 4}$	**1.8**(0.9)$^{\star 4}$	∞	∞	∞ *4e5*	0/15
xNESas	1.0(0.3)	11(0.7)	16(0.6)	**5.6**(2)$^{\star 4}$	**2.9**(1)$^{\star 4}$	**1.8**(0.5)$^{\star 4}$	15/15

Table 173: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{122}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f122	4936	2.7e5	6.4e5	2.8e6	1.2e7	3.3e7	11/15
SNES	2.1(3)	∞	∞	∞	∞	∞ *4e5*	0/15
xNESas	**1.2**(0.8)	∞	∞	∞	∞	∞ *2e7*	0/15

Table 174: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{123}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f123	13229	2.4e6	9.4e6	2.4e7	2.3e8	7.3e8	0
SNES	77(83)	∞	∞	∞	∞	∞ *4e5*	0/15
xNESas	**25**(28)	∞	∞	∞	∞	∞ *2e7*	0/4

Table 175: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{124}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f124	570	30165	2.1e5	3.7e5	1.1e6	2.2e6	15/15
SNES	**0.64**(0.1)$_{\downarrow 2}$	**0.15**(0.0)	**0.69**(0.5)	∞	∞	∞ *4e5*	0/15

Table 176: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{125}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f125	1	4611	1.1e8	5.4e8	∞	∞	0
SNES	2.3(2)	44(49)	∞	∞	.	.	0/15
xNES	**1.4**(0.5)	3.2(5)	∞	∞	.	.	0/15
xNESas	1.7(2)	**2.3**(2)	∞	∞	.	.	0/15

Table 177: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{126}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f126	1	8740	∞	∞	∞	∞	0
SNES	**1.4**(0.5)	∞	.	.	.	.	0/15
xNES	2.1(2)	**1088**(835)	.	.	.	.	0/12
xNESas	1.8(2)	1183(1011)	.	.	.	.	0/15

Table 178: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{127}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f127	1	702	1.8e6	1.5e7	2.6e7	2.7e7	15/15
SNES	**1.5**(1)	**0.58**(0.3)$_{\downarrow 2}$	∞	∞	∞	∞ *4e5*	0/15
xNESas	1.7(0.5)	0.68(0.3)	∞	∞	∞	∞ *2e7*	0/10

Table 179: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{128}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f128	4.1e6	3.8e7	1.1e8	1.1e8	1.1e8	1.1e8	4/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15

Table 180: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{129}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f129	3.5e7	3.8e7	1.0e8	1.0e8	1.0e8	1.0e8	2/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15

Table 181: 40-D, running time excess ERT/ERT$_{\text{best 2009}}$ on f_{130}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f130	12699	2.8e5	1.7e6	1.7e6	1.7e6	1.7e6	3/15
SNES	**0.64**(1)	**0.27**(0.3)	**0.07**(0.1)$_{\downarrow 2}$	**0.07**(0.1)$_{\downarrow 2}$	**0.13**(0.1)$_{\downarrow}$	**0.23**(0.3)	4/15

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