

Table 1: Statistical results obtained from complex mathematical benchmark functions.

No		SA	VS	GA	DE	PSO	ABC	EFO
F1	Mean	4469.40	2368.09	44353.74	100	1651.12	141.4930	107.3227
	StdDev	5627.24	2077.43	24920.64	0	1815.24	41.6740	10.0062
	Best	102.5100	126.0100	5782.20	100	100.0300	102.8600	100.0700
F2	Mean	200	200	200	200	200.0667	200	200
	StdDev	0	0	0	0	0.3651	0	0
	Best	200	200	200	200	200	200	200
F3	Mean	300	300	304.6387	300	300	1343.35	300.0087
	StdDev	0	0	5.2976	0	0	1181.61	0.0183
	Best	300	300	300.6100	300	300	304.3600	300
F4	Mean	400.0987	400.0280	405.7250	400.4990	400.0557	400.0367	400.0460
	StdDev	0.2387	0.0055	2.4682	0.0843	0.0588	0.0722	0.1208
	Best	400.0300	400.0200	400.0200	400.3200	400.0100	400	400
F5	Mean	755.5607	511.8057	509.4883	505.3063	530.1460	506.9760	505.7757
	StdDev	120.7299	5.1124	3.2082	1.3260	11.0003	2.1893	1.3179
	Best	578.6000	502.9800	504.9900	501.4800	512.9300	501.9900	502.9800
F6	Mean	695.3383	600.1060	600.1927	600	603.4080	600	600
	StdDev	21.8204	0.2992	0.1081	0	4.3333	0	0
	Best	657.9300	600	600.0600	600	600	600	600
F7	Mean	1446.01	724.9803	723.6253	716.4080	727.3290	715.9357	714.7317
	StdDev	208.4490	7.1394	6.3398	1.1591	6.0651	2.9623	1.1490
	Best	1008.70	710.9000	709.6200	712.6300	717.8700	708.9700	712.5100
F8	Mean	969.1457	814.2927	811.5323	805.2133	818.1397	807.2397	804.6817
	StdDev	51.4027	5.8225	3.7341	1.0222	7.6214	1.9402	1.2371
	Best	866.6600	805.9700	805.1600	802.8300	805.9700	802.9900	801.9900
F9	Mean	4518.61	900	900.5137	900	908.3160	900.0270	900
	StdDev	1540.58	0	1.5035	0	32.0894	0.0857	0
	Best	2378.10	900	900.0100	900	900	900	900
F10	Mean	2888.21	1461.23	1250.84	1046.53	1840.31	1163.68	1163.94
	StdDev	425.4281	231.8863	144.4713	53.4233	306.1420	81.5511	105.0123
	Best	1844.80	1145.10	1003.80	1003.70	1130.70	1011.10	1007
F11	Mean	1206.86	1108.52	1106.85	1100	1128.09	1102.22	1101.76
	StdDev	66.8479	5.6351	4.2800	0	16.8501	1.3830	0.7228
	Best	1122	1101.80	1100.50	1100	1102	1100	1100
F12	Mean	12492.59	18922.91	19698.11	1395.94	10500.05	26976.70	11896.32
	StdDev	12523.35	13709.15	17687.64	72.0098	9811.91	36273.43	9039.90
	Best	2843.30	3001	1927.60	1255.50	1951.40	2282	3322.10
F13	Mean	23357.22	8204.96	8386.18	1305.19	4586.31	1514.82	1699.17
	StdDev	15752.82	4430.02	7446.84	0.1961	2631.09	250.4851	436.8221
	Best	3555	2887.80	1313.50	1304.90	1342.70	1308.90	1345.80
F14	Mean	19132.07	1445.79	1426.29	1400.07	1504.90	1532.74	1500.68
	StdDev	12579.66	20.0783	16.1839	0.2537	146.9800	136.8390	89.7459
	Best	1495.30	1410.60	1403	1400	1426	1402.50	1412.30
F15	Mean	8068.93	1581.06	1568.51	1500.07	1532.04	1532.02	1526.35
	StdDev	8742.19	42.3158	90.9083	0.2537	20.9162	31.1662	27.1457
	Best	1578.60	1511.80	1505.40	1500	1504.20	1502.60	1501.50
F16	Mean	2300.19	1604.38	1613.48	1600.21	1840.64	1604.92	1600.75
	StdDev	196.9291	2.6184	30.1154	0.1479	120.1070	9.9633	0.2240
	Best	1937.70	1601.40	1600.80	1600	1601.30	1600.30	1600.30
F17	Mean	2063.60	1728.42	1714.72	1700.14	1763.38	1701.35	1700.90
	StdDev	155.5076	10.1869	14.0011	0.2176	52.1834	0.6213	0.5617
	Best	1745.90	1701.10	1700.90	1700	1722.70	1700	1700
F18	Mean	23703.73	7557.97	6261.54	1800	2627.11	2300.20	2081.58
	StdDev	17645.84	5353.85	5632.90	0	1459.32	546.9085	227.8025
	Best	2327.30	2248.60	1997.50	1800	1839.60	1828.10	1809.10
F19	Mean	9111.53	1928.42	1917.69	1900	1916.71	1921.30	1947.25
	StdDev	9203.30	20.4169	18.2199	0	10.7690	29.0452	69.0154
	Best	1975.70	1909.20	1900.50	1900	1903.10	1901.20	1901.90
F20	Mean	2460.72	2030.19	2004.76	2000.05	2083.61	2000.05	2000.04
	StdDev	186.2039	12.7894	7.2390	0.1383	54.4592	0.1943	0.1888
	Best	2025.30	2001.40	2000.10	2000	2017.30	2000	2000
F21	Mean	2511.63	2200.17	2273.55	2262.27	2298.71	2197.29	2202.66
	StdDev	113.4513	0.6596	55.5408	50.0902	56.0405	26.0317	1.5535
	Best	2202.20	2200	2200.10	2201.70	2200	2100.50	2200.60
F22	Mean	4069.68	2212.14	2303.42	2294.41	2299.29	2243.38	2253.01
	StdDev	923.2380	11.3971	1.2566	18.4391	13.5730	25.7756	24.0556
	Best	2302	2200	2301	2232.80	2227.80	2200.20	2220.60
F23	Mean	3201.69	2603.43	2614.28	2606.95	2647.81	2595.21	2580.57
	StdDev	353.7708	57.6396	4.1784	1.3390	20.1321	63.9358	90.6102
	Best	2761.80	2300	2606.30	2603.20	2615.20	2300.30	2310.70
F24	Mean	2899.34	2500	2720.27	2728.90	2705.38	2488.10	2498.31
	StdDev	218.7594	0	74.7838	41.4078	110.0312	27.2360	24.5540
	Best	2500	2500	2500.40	2529.20	2500	2416.80	2434.90
F25	Mean	2917.95	2910.31	2922.76	2898.16	2917.45	2655.28	2868.63
	StdDev	88.5449	20.5478	24.5282	0.3755	23.0279	85.7445	89.3096
	Best	2600.30	2897.70	2897.90	2897.70	2897.70	2600.20	2601.20
F26	Mean	4448.45	2900	2912.50	2901.88	2884.09	2674.75	2649.49
	StdDev	989.6021	0	35.7305	18.4601	97.0212	96.9431	84.6459
	Best	2800	2900	2821.40	2863.40	2600	2600	2600
F27	Mean	3494.92	3092.80	3094.11	3089.31	3124.18	3092.72	3093.25
	StdDev	515.4051	3.3061	2.7711	0.3791	38.7992	2.2209	2.0799
	Best	3088.70	3087.30	3087.70	3089	3095	3087.90	3089.40

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Table 1 (continued)

No		SA	VS	GA	DE	PSO	ABC	EFO
F28	Mean	3187.24	3100	3153.43	3322.45	3262.38	3030.62	3030.61
	StdDev	52.6208	0	66.2232	111.5397	147.0386	116.1583	119.5741
	Best	3100	3100	3100.40	3100	3100	2806.70	2800.90
F29	Mean	3753.58	3151.25	3162.62	3141.10	3229.78	3136.94	3148.40
	StdDev	251.5545	17.2071	17.6398	2.4747	47.7036	21.6810	18.4621
	Best	3390.80	3131.80	3135.30	3137.10	3157.50	3077.10	3074.10
F30	Mean	11182.65	7725.66	20683.13	5129.14	156975.69	6168.00	12441.00
	StdDev	6491.10	2812.11	19851.31	1120.44	399823.48	2271.79	10618.56
	Best	4364.60	3936	4047.80	3860.30	3595.80	3783.60	3900.50