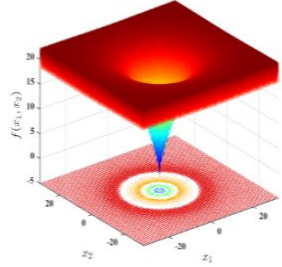
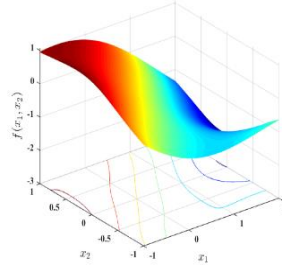
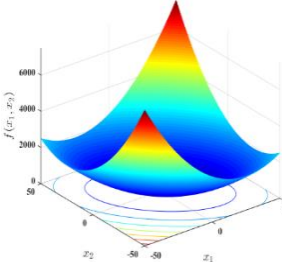
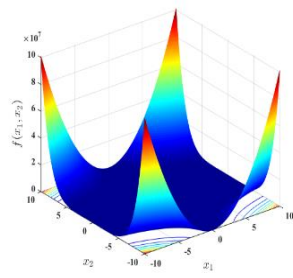
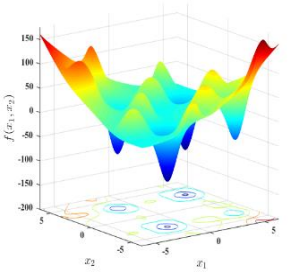
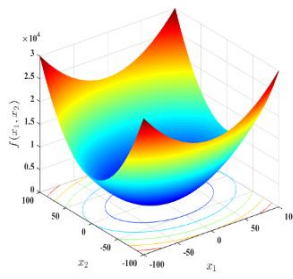
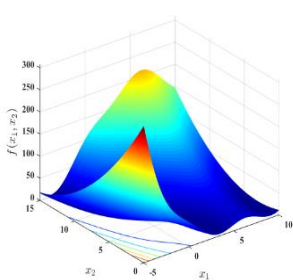


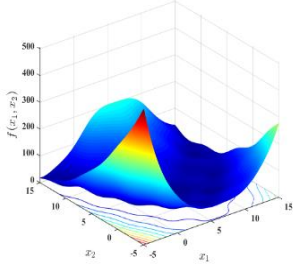
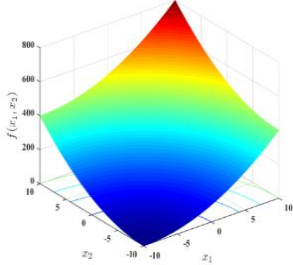
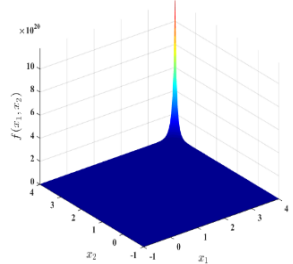
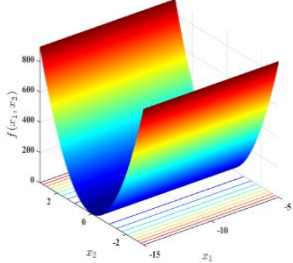
Function	Graph	Dimension	Domain	Reference provided global minimum	Reference provided global minimizers	Algorithm minimum	Algorithm Minimizers	Multiple Runs of L
----------	-------	-----------	--------	-----------------------------------	--------------------------------------	-------------------	----------------------	--------------------

**Total success number: 224 sample formulas**

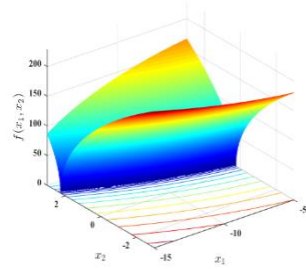
**1. Dimension=2,3 (Total 108 sample formulas)**

Ackley		2	[-32,32]	0	[0,0]	0.001045278367209	[-2.604166666647793e-04,-2.604166666647793e-04]	3
Adjiman		2	[-1,2;-1,1]	- 2.02180678 3337020	[2,0.10578]	- 2.02138287254885 0	[1.999609375000000,0.105468750000000]	3
BartelsConn		2	[-50,50]	1	[0,0]	1.000203471215490	[2.034505208356648e-04,-2.034505208356648e-04]	3

Beale		2	$[-10, 10]$	0	$[3, 0.5]$	3.12479130077643 5e-07	$[2.999023437500000, 0.49$ $9674479166667]$	9
Bird		2	$[-2\pi, 2\pi]$	-106.764537	$[4.70104, 3.15$ $294], [-$ $1.58214, -$ $3.13024]$	$[-$ $1.06764534164129$ $4e+02; -$ $1.06744518305314$ $8e+02]$	$[-1.582045519239391, -$ $3.130343461145299],$ $[4.697458234049269, 3.14$ $1388122818075]$	3
Bohachevsky		2	$[-100, 100]$	0	$[0, 0]$	1.98295872833043 1e-06	$[-2.034505208379963e-$ $04, -2.034505208379963e-$ $04]$	3
Branin01		2	$[-5, 10; 0, 15]$	0.39788735 772973816	$[-\pi, 12.275],$ $[\pi, 2.275],$ $[9.42478, 2.47$ $5]$	$[0.3978875860317$ $27; 0.40156931363$ $3996; 0.401659155$ $743550]$	$[9.424560546875000, 2.47$ $4853515625000],$ $[3.124755859375000, 2.23$ $9990234375000], [-$ $3.125732421875000, 12.18$ $6279296875000]$	3

Branin02		2	[-5,15]	5.559037	[-3.2,12.53]	5.55891452322875 9	[- 3.196940104166666,12.52 6367187500002]	3
Brent		2	[-10,10]	0	[-10,-10]	2.11927625866513 [-9.999674479166668,- 6e-07 9.999674479166668]	3	
Brown		2	[-1,4]	0	[0,0]	2.11927265210592 [-3.255208333332986e- 2e-07 04,-3.255208333332986e- 04]	3	
Bukin04		2	[-15,-5;- 3,3]	0	[-10,0]	7.06990559893944 [-10.000325520833332,- 4e-06 1.953124999998196e-04]	3	

Bukin06



2

[-15,-5;-  
3,3]

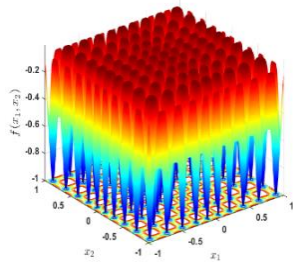
0

[-10,1]

0.00977539057270 [-  
4 9.999023437500000,0.999  
804687500000]

11

Deb02



2

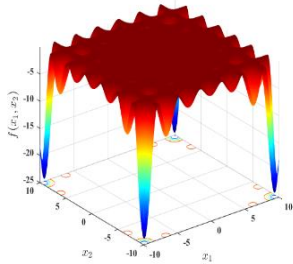
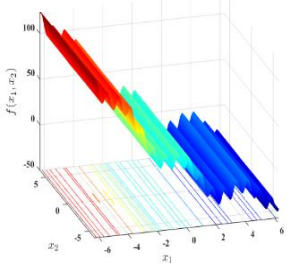
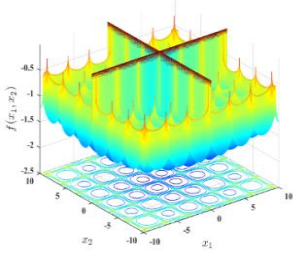
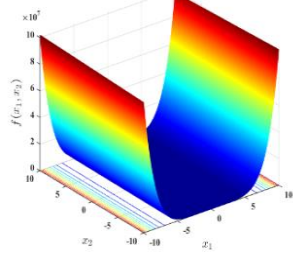
[0,1]

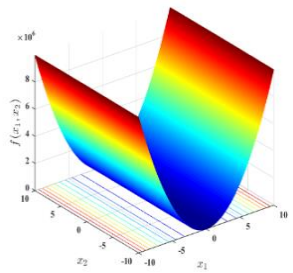
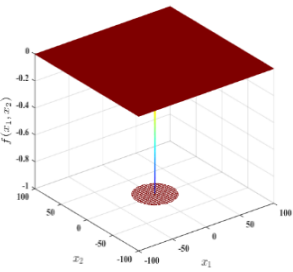
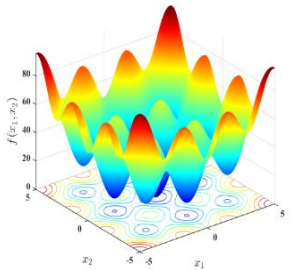
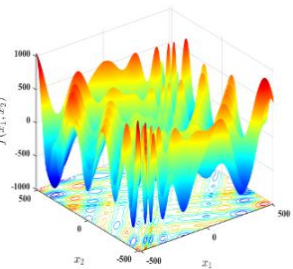
0

25 solutions

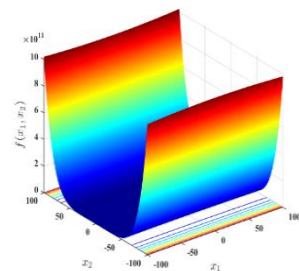
[-  
0.99999859940099 [0.246614583333333,0.24  
2;- 6614583333333],[0.68151  
0.99999589682939 0416666667,0.681510416  
4;- 666667],[0.934114583333  
0.99998893142551 333,0.246614583333333],  
5;- [0.246614583333333,0.93  
0.99998893142551 4114583333333]  
5]

3

CarromTable		2	[-10,10]	-24.1568155	$[\pm 9.64615726$ $6348881, \pm 9.6$ $46157266348$ $881]$	$[-$ $24.1568155434457$ $50;-$ $24.1429554776915$ $23;-$ $24.1429554776915$ $23;-$ $24.1430649434762$ $??]$	$[-9.646158854166666,-$ $9.646158854166666],$ $[9.635091145833336,-$ $9.666992187500000], [-$ $9.666992187500000, 9.635$ $091145833336],$ $[9.637044270833336, 9.62$ $4674479166668]$	3
Chichinadze		2	[-30,30]	$-$ $42.9443870$ $1899098$	$[6.189866586$ $965680, 0.5]$	$-$ $42.9443795875715$ $96$	$[6.189697265625000, 0.49$ $9755859375000]$	3
CrossInTray		2	[-15,15]	$-$ $2.06261187$ $0822739$	$[\pm 1.34940660$ $8602084, \pm 1.3$ $49406608602$ $084]$	$-$ $2.06261187045161$ $1$	$[-1.349365234375000,-$ $1.349365234375000; 1.349$ $365234375000,-$ $1.349365234375000;-$ $1.349365234375000, 1.349$ $365234375000; 1.3493652$ $34375000, 1.34936523437$ $5000]$	3
Cube		2	[-10,10]	0	[1,1]	$6.01223303294126$ $6e-04$	$[0.979166666666667, 0.93$ $7500000000001]$	4

DeckkersAarts		2	[-20,20]	-24777	[0,±15]	- 2.47765077181418 9e+04	[-3.255208333321676e-04,- 14.944986979166664], [-3.255208333321676e-04,14.944986979166668]	3
Easom		2	[-100,100]	-1	[π,π]	- 0.99999997554362 5	[3.141682942708338,3.141682942708338]	3
EggCrate		2	[-5,5]	0	[0,0]	5.51011808542075 2e-06	[-3.255208333330419e-04,-3.255208333330419e-04]	3
EggHolder		2	[-512,512]	- 959.640662 711	[512,404.231 9]	- 9.59639781046256 1e+02	[5.119997395833333e+02,4.042315104166667e+02]	3

ElAttarVidyasagarDutta



2

[-100,100]

1.71278035  
4

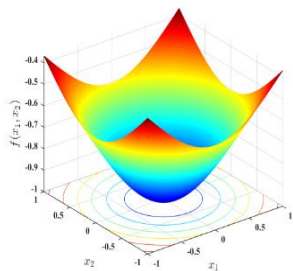
[3.40918683,-  
2.17143304]

1.71278050454867  
7

[3.409220377604166,-  
2.171427408854172]

3

Exponential



2

[-1,1]

-1

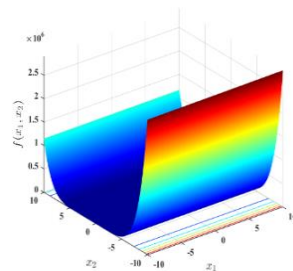
[0,0]

-  
0.99999993218316  
2

[-2.604166666666077e-  
04,-2.604166666666077e-  
04]

3

FreudensteinRoth



2

[-10,10]

0

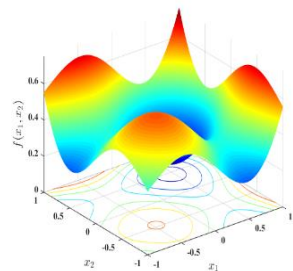
[5,4]

2.04481326071192  
5e-04

[5.010742187499999,3.99  
9674479166667]

3

Giunta



2

[-1,1]

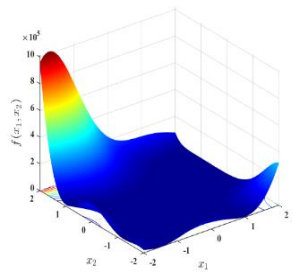
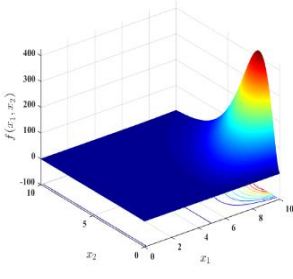
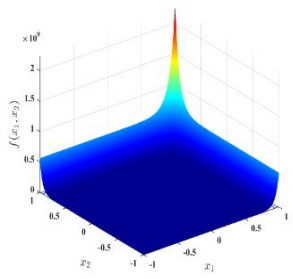
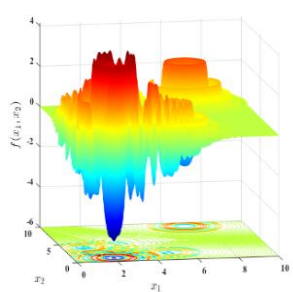
0.06447042  
053690566

[0.467320027  
7395354,0.46  
73200169591  
304]

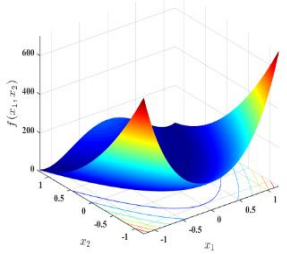
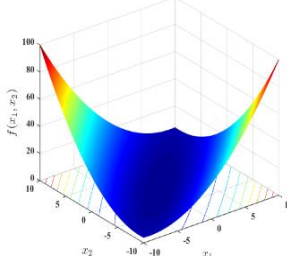
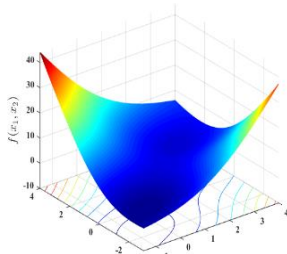
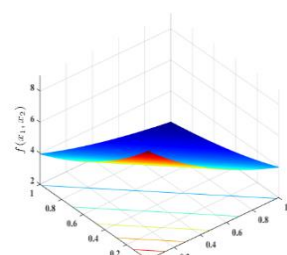
0.06447045490016  
1

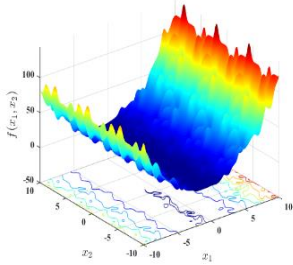
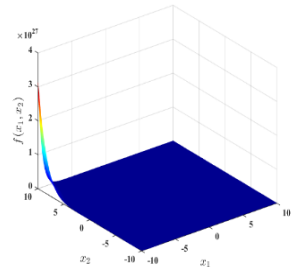
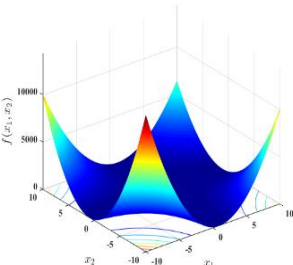
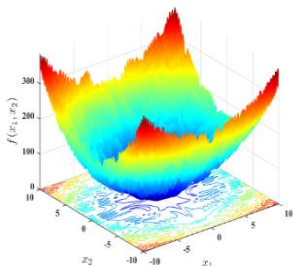
[0.467447916666667,0.46  
744791666667]

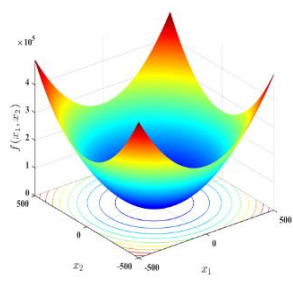
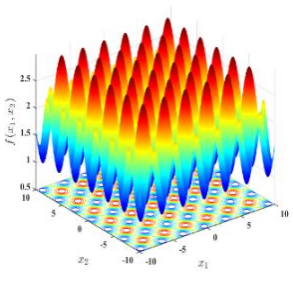
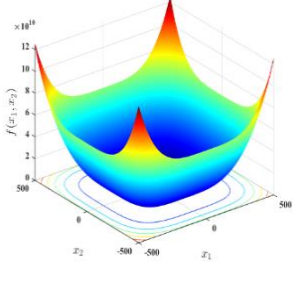
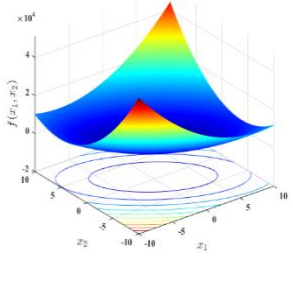
3

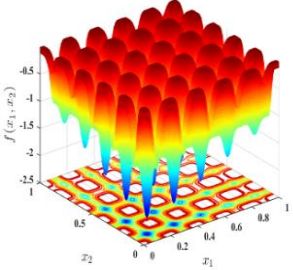
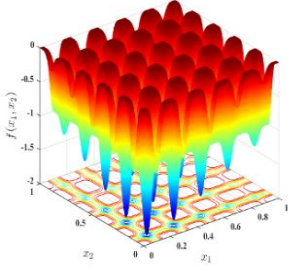
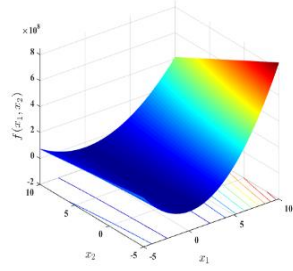
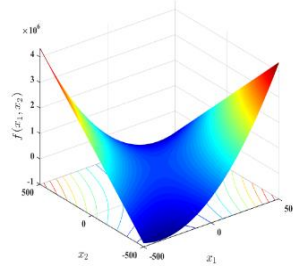
GoldsteinPrice		2	[-2,2]	3	[0,-1]	3.00003172947538 8	[2.60416666667708e-04,- 0.999739583333333]	3
Hosaki		2	[0,10]	-2.3458	[4,2]	- 2.34581134190866 2	[3.999674479166666,2.00 0325520833333]	3
JennrichSampson		2	[-1,1]	124.362182 4	[0.257825,0.2 57825]	1.24362507325324 6e+02	[0.258072916666667,0.25 7552083333334]	3
Langermann		2	[0,10]	-5.1621259	[2.0029921,1. 006096]	- 5.16212595302477 3	[2.002929687500000,1.00 6184895833333]	3

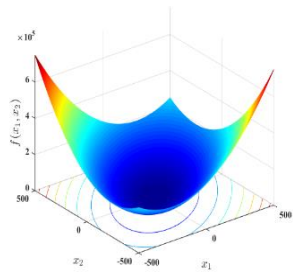
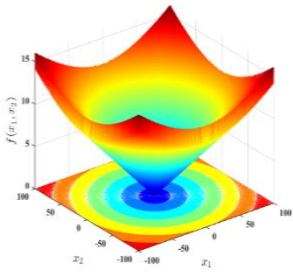
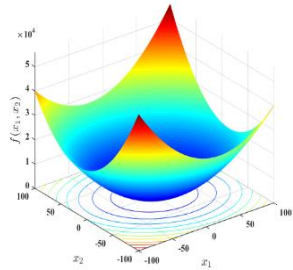
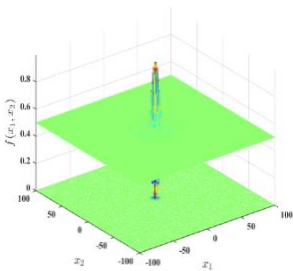


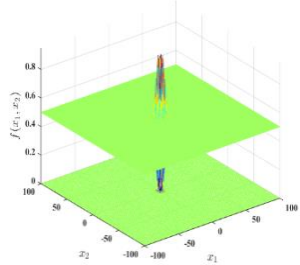
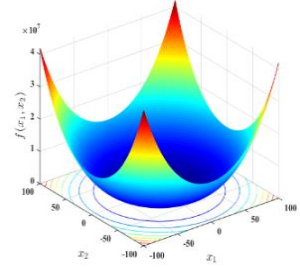
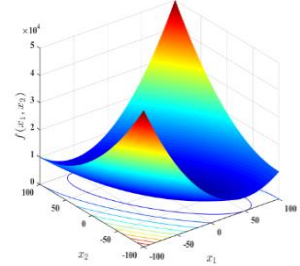
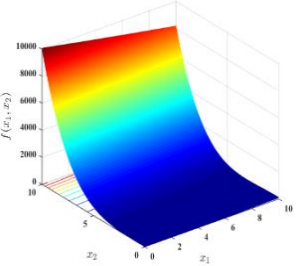
Leon		2	[-1.2,1.2]	0	[1,1]	9.85717868803991 9e-06	[0.999687500000000,0.99 9687500000000]	3
Matyas		2	[-10,10]	0	[0,0]	4.23855251734593 8e-09	[-3.255208333327505e- 04,-3.255208333327505e- 04]	3
McCormick		2	[-1.5,4;- 3,4]	- 1.91322295 4981037	[- 0.5471975602 - 214493,- 1.5471975592 4 68372]	1.91322291170282	[-0.547347005208333,- 1.547363281250000]	3
Mishra02		2	[0,1]	2	[1,1]	2.00062157825276 8	[0.999739583333333,0.99 97395833333333]	3

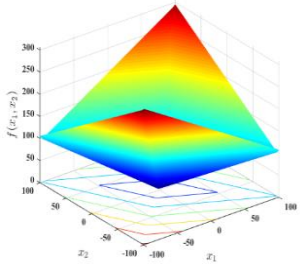
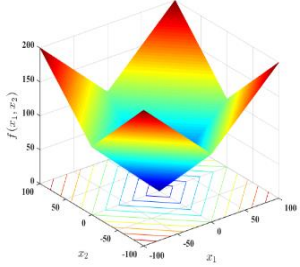
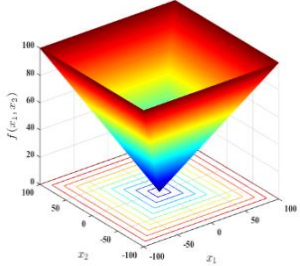
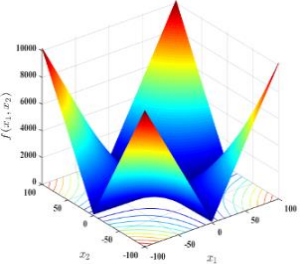
Mishra05		2	[-10,10]	-0.119829	[-1.98682,-10]	- 0.11982584609557 1	[-1.986653645833334,-9.999674479166668]	3
Mishra08		2	[-10,10]	0	[2,-3]	2.19021057784919 6e-31	[1.999674479166667,-3.000325520833334]	3
Mishra10		2	[-10,10]	0	[0,0];[2,2]	[1.1228329651437 14;1.12283297247 1801e-14]	[3.255208333327505e-04,-3.255208333327505e-04;2.000325520833333,1.999674479166667]	3
Pinter		2	[-10,10]	0	[0,0]	7.20088296746248 4e-06	[-3.255208333327505e-04,-3.255208333327505e-04]	3

Price01		2	[-500,500]	0	[±5,±5]	1.86264514899243 3e-07	[-5.000305175781231,- 5.000305175781231], [5.000305175781231,- 5.000305175781231], [- 5.000305175781231,5.000 305175781231], [5.000305175781231,5.00 0305175781231]	3
Price02		2	[-10,10]	0.9	[0,0]	0.90000023312037 9	[-3.25520833327505e- 04,-3.25520833327505e- 04]	3
Qing		2	[-500,500]	0	[±1, ±√2]	1.48660579121172 3e-06	[-1.000467936197897,- 1.414489746093731], [1.000467936197897,- 1.414489746093731], [- 1.000467936197897,1.414 489746093731], [1.000467936197897,1.41 4489746093731]	3
Quadratic		2	[-10,10]	-3873.72418	[0.19388,0.48 513]	3.87372417540126 4e+03	[0.193684895833333,0.48 5351562500000]	3

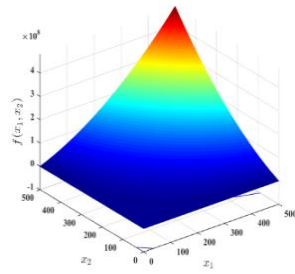
Ripple01		2	[0,1]	-2.2	[0.1,0.1]	- 2.17999035978721 0	[0.0981770833333333,0.09 817708333333333]	3
Ripple25		2	[0,1]	-2	[0.1,0.1]	- 1.99989930965285 8	[0.0997395833333333,0.09 973958333333333]	3
Rosenbrock		2	[-5,10]	0	[1,1]	6.01715909454014 8e-06	[0.999755859375000,0.99 9755859375000]	3
RotatedEllipse 01		2	[-500,500]	0	[0,0]	2.48551760744524 3e-06	[-5.086263020637934e- 04,-5.086263020637934e- 04]	3

RotatedEllipse02		2	[-500,500] 0	[0,0]	2.58700715151089 2e-07	[-5.086263020637934e-04,-5.086263020637934e-04]	3
Salomon		2	[-100,100] 0	[0,0]	3.04063433180674 6e-05	[-2.034505208379963e-04,-2.034505208379963e-04]	8
Sargan		2	[-100,100] 0	[0,0]	9.93410746302047 0e-08	[2.034505208379963e-04,-2.034505208379963e-04]	3
Schaffer01		2	[-100,100] 0	[0,0]	0	[-2.034505208379963e-04,-2.034505208379963e-04]	4

Schaffer02		2	[-100,100]	0	[0,0]	0	[-2.034505208379963e-04,-2.034505208379963e-04]	3
Schwefel01		2	[-100,100]	0	[0,0]	2.80148927939922	[-2.034505208379963e-04,-2.034505208379963e-04]	3
Schwefel02		2	[-100,100]	0	[0,0]	4.13921144292519	[2.034505208379963e-04,-6e-08, 2.034505208379963e-04]	3
Schwefel04		2	[0,10]	0	[1,1]	2.11858650238974	[1.000976562500000,1.000325520833333]	3

Schwefel06		2	[-100,100]	0	[1,3]	2.84830729151863 7e-04	[0.999959309895839,2.99 9877929687505]	4
Schwefel20		2	[-100,100]	0	[0,0]	8.13802083342659 2e-04	[-4.069010416713296e- 04,-4.069010416713296e- 04]	3
Schwefel21		2	[-100,100]	0	[0,0]	2.03450520837996 3e-04	[-2.034505208379963e- 04,-2.034505208379963e- 04]	3
Schwefel22		2	[-100,100]	0	[0,0]	8.13967651800372 4e-04	[-4.069010416713296e- 04,-4.069010416713296e- 04]	3

Schwefel36



2

[0,500]

-3456

[12,12]

-

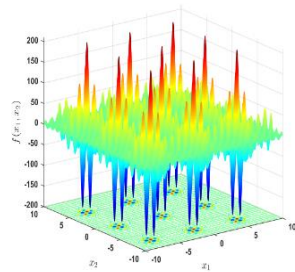
3.45599999841799  
9e+03

[12.000274658203125,11.  
999766031901043]

4



Shubert01



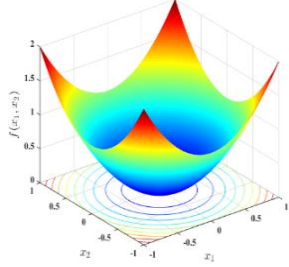
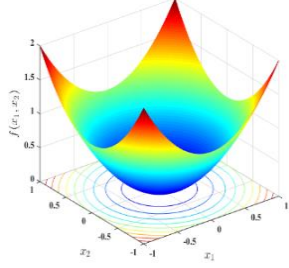
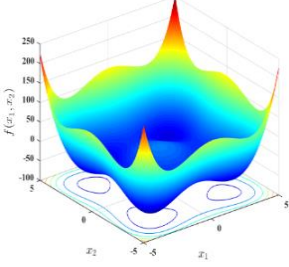
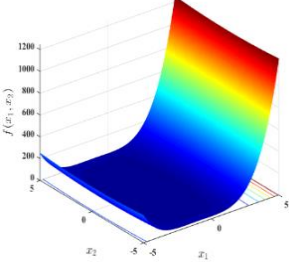
2

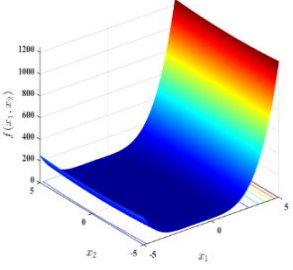
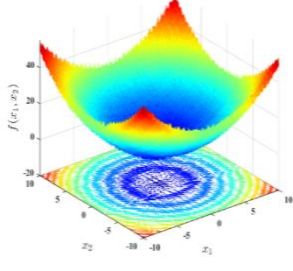
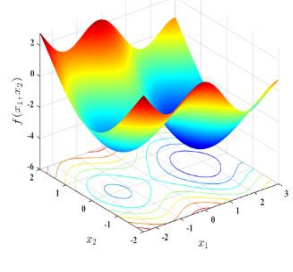
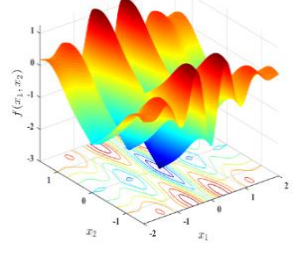
[-10,10] -186.7309

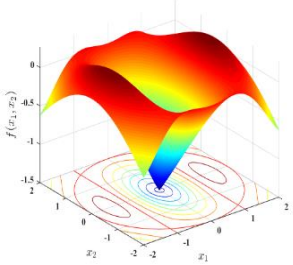
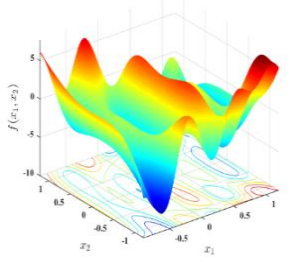
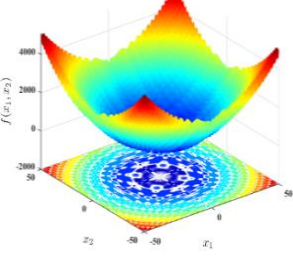
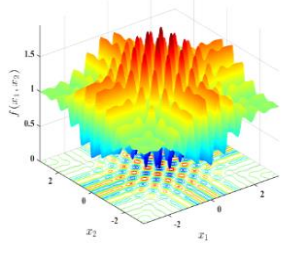
[-7.0835,4.8580]  
(and many others)

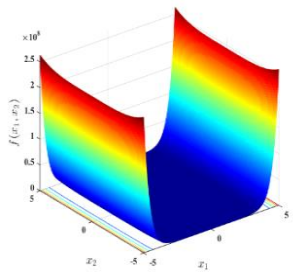
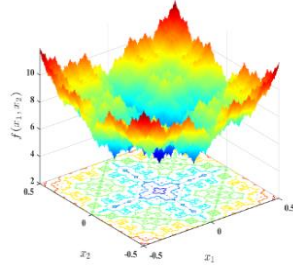
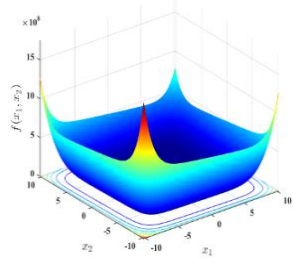
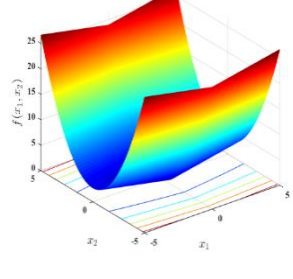
[-5.48274739583333,-  
186.730660531734 7.70800781250000], [-  
;- 7.70800781250000,5.4827  
186.730660531734 4739583333],  
;- [5.48274739583333,4.857  
186.730655466520 74739583333],  
;- [4.85774739583333,5.482  
186.730655466520 74739583333], [-  
;- 0.800455729166667,-  
186.730650631229 7.70800781250000], [-  
;- 7.70800781250000,-  
186.730650631229 0.800455729166667],  
;- [4.85774739583333,-  
186.730645566015 0.800455729166667], [-  
7.0835,4.8580;- 0.800455729166667,4.857  
186.730645566015 74739583333], [-  
;- 7.08365885416667,-  
186.730639327517 7.70800781250000], [-  
;- 7.70800781250000,-  
186.730639327517 7.08365885416667],  
;- [5.48274739583333,-  
186.730634379522 1.42480468750000], [-  
;- 1.42480468750000,5.4827  
186.730634379522 4739583333],  
;- [4.85774739583333,-  
186.730634262303 7.08365885416667], [-  
;- 7.08365885416667,4.8577  
186.730634262303 4739583333], [-  
;- 0.800455729166667,-  
186.730624479019 1.42480468750000] [-

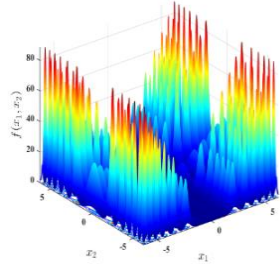
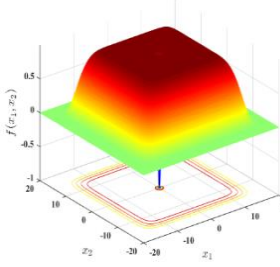
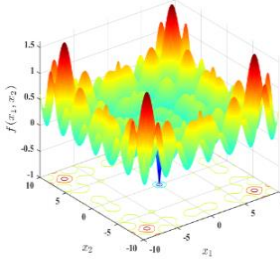
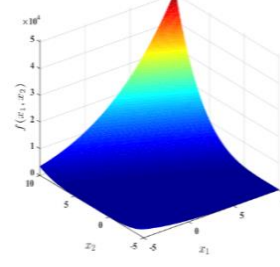
3

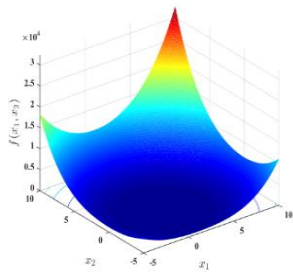
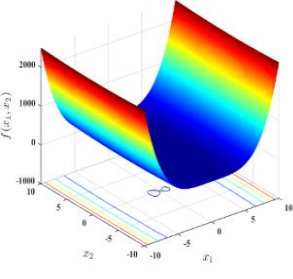
SixHumpCamel 1		2	[-5,5]	- 1.03162845 3489877	[0.089842013 68301331,- 0.7126564032 704135], [- 0.0898420136 8301331,0.71 26564032704 135]	- 1.03162800605788 6	[0.089518229166666,- 0.712565104166667], [- 0.089518229166666,0.712 565104166667]	3
Sphere		2	[-1,1]	0	[0,0]	1.35633680555494 1e-07	[-2.604166666666077e- 04,-2.604166666666077e- 04]	3
StyblinskiTang		2	[-5,5]	- 78.3323314 0754284	[-2.903534,- 2.903634]	- 78.3323298281020 50	[-2.903320312500000,- 2.903320312500000]	3
ThreeHumpCamel		2	[-5,5]	0	[0,0]	2.11927614077930 1e-07	[3.255208333330419e-04,- 3.255208333330419e-04]	3

Treccani		2	[-5,5]	0	[0,0;-2,0]	[5.2968110178890 36e- 07;5.29681102182 7623e-07]	[-1.999674479166667,- 3.255208333330419e-04], [-3.255208333330419e- 04,-3.255208333330419e- 04]	3
Trefethen		2	[-10,10]	- 3.30686864 74	[- 0.0244030792 3,0.21061242 61]	- 3.30686828534839 7	[- 0.024414062499999,0.210 611979166666]	5
Ursem01		2	[-2.5,3;- 2,2]	-4.8168	[1.69714,0]	- 4.81681391005236 9	[1.696972656250000,- 2.604166666665487e-04]	3
Ursem03		2	[-2,2;- 1.5,1.5]	-3	[0,0]	- 2.99942793590936 5	[-2.604166666665487e- 04,-1.953124999999098e- 04]	3

Ursem04		2	$[-2,2]$	-1.5	$[0,0]$	- 1.49972366093820 1	$[-2.604166666665487e-04,-2.604166666665487e-04]$	3
UrsemWaves		2	$[-0.9,1.2;-1.2,1.2]$	-8.5536	$[1.2,1.2]$	- 8.54028616218871 4	$[1.199726562500000,1.199687500000000]$	3
VenterSobieczanskiSobieski		2	$[-50,50]$	-400	$[0,0]$	- 3.9999999917215 6e+02	$[-2.034505208356648e-04,-2.034505208356648e-04]$	3
Wavy		2	$[-\pi,\pi]$	0	$[0,0]$	2.11255747406546 9e-06	$[2.045307717179398e-04,-2.045307717183839e-04]$	3

WayburnSeader01		2	[-5,5]	0	[1,2]	4.12197390581753 0e-04	[1.010742187500000,1.99 7721354166667]	4
Weierstrass		2	[-0.5,0.5]	4	[0,0]	4.07181094663412 9	[2.604166666666927e- 04,2.604166666666927e- 04]	3
Whitley		2	[- 10.24,10.24	0	[1,1]	1.25677246387567 7e-13	[0.999666666666667,0.99 966666666667]	3
XinSheYang01		2	[-5,5]	0	[0,0]	1.78122788941239 2e-04	[-3.255208333330419e- 04,-3.255208333330419e- 04]	3

XinSheYang02		2	$[-2\pi, 2\pi]$	0	$[0, 0]$	4.09061509211180 2e-04	$[2.045307717177941e-04, 2.045307717177941e-04]$	3
XinSheYang03		2	$[-20, 20]$	-1	$[0, 0]$	- 0.99999915228966 9	$[-3.25520833321676e-04, -3.25520833321676e-04]$	3
XinSheYang04		2	$[-10, 10]$	-1	$[0, 0]$	- 0.99934881722908 7	$[-3.25520833327505e-04, -3.25520833327505e-04]$	3
Zacharov		2	$[-5, 10]$	0	$[0, 0]$	1.34110450966673 5e-07	$[2.441406250000000e-04, 2.441406250000000e-04]$	3

Zettl		2	[-1,5]	-0.0037912	[-0.029896,0]	5.52427172801990 4e-04	[-0.029882812500000,- 1.953124999999306e-04]	3
Zirilli		2	[-10,10]	-0.3523	[-1.0465,0]	- 0.35238600118436 9	[-1.046549479166666,- 3.255208333327505e-04]	3
Ackley		3	[-32,32]	0	[0,0,0]	0.00104527836720 9	[-2.604166666647793e- 04,-2.604166666647793e- 04]	3
BoxBetts		3	[0.9,1.2;9,1 1.2;0.9,1.2]	0	[1,10,1]	2.80272460427755 7e-09	[0.998125000000000,10.0 037499999999998,1.00062 50000000000]	3
Brown		3	[-1,4]	0	[0,0,0]	1.05963763960335 8e-07	[-1.627604166666320e- 04,-1.627604166666320e- 04]	3

Exponential	3	[-1,1]	-1	[0,0,0]	- 0.99999989827474 5	[-2.604166666666077e- 04,-2.604166666666077e- 04,-2.604166666666077e- 04]	3
Gulf	3	[0.1,100;0, 25.6;0,5]	0	[50,25,1.5]	[1.2431357960902 82e- 04;1.92028240456 9618e-04]	[53.796250000000000,24. 853333333333335,1.5208 33333333333],[47.136250 00000000,25.066666666 66666,1.479166666666 67]	3
Hartmann3	3	[0,1]	- 3.86278214 782076	[0.1,0.555920 03,0.8521825 9]	- 3.86279665416392 9	[0.114843750000000,0.55 546875000000,0.852343 750000000]	3
Mishra02	3	[0,1]	2	[1,1,1]	2.00124345145613 4	[0.999739583333333,0.99 973958333333,0.999739 583333333]	3



					[1.31250000000000,1.97916666666667,2.31250000000000],	
					[0.937500000000001,2.06250000000000,2.97916666666667],	
				[2.49061660210874e-09;1.92041964311510e-07;6.76568979481599e-07;2.31386871538435e-06;2.49579125829759e-06;1.14550848453312e-05;2.45170142346719e-05;3.01319615226908e-05;4.55721072534998e-05;6.65330489124780e-05;6.65330489124780e-05]		
Mishra09	3	[-10,10]	0	[1,2,3]	[1.77083333333333,1.72916666666667,2.14583333333333],	4
					[2.47916666666667,0.43750000000000,2.77083333333333],	
					[3.85416666666667,-2.85416666666667,1.60416666666667],	
					[2.14583333333333,1.14583333333333,2.64583333333333],	
					[0.937500000000001,2.31250000000000,0.104166666666666],	
					[1.31250000000000,2.18750000000000,-2.35416666666667],	
					[0.354166666666667,2.27083333333333,2.47916666666667],	
					[1.60416666666666,1.60416666666667,2.77083333333333]	
					[-1.627604166660838e-04,-1.627604166660838e-04,-1.627604166660838e-04]	
Pinter	3	[-10,10]	0	[0,0,0]	3.707517596890240e-06	3

Qing	3	[-500,500]	0	$[\pm 1, \pm \sqrt{2}, \pm \sqrt{3}]$	2.55837010266557 5e-07	$[\pm 1.00021362304686, \pm 1.41423543294269, \pm 1.73212687174477]$	3
Rosenbrock	3	[-5,10]	0	[1,1,1]	1.20343181890803 0e-05	$[0.999755859375000, 0.9997559755859375000, 0.999755859375000]$	3
Sargan	3	[-100,100]	0	[0,0,0]	2.73187955233062 9e-07	$[2.034505208379963e-04, -2.034505208379963e-04, -2.034505208379963e-04]$	3
Schwefel01	3	[-100,100]	0	[0,0,0]	5.74781253397579 8e-13	$[-2.034505208379963e-04, -2.034505208379963e-04, -2.034505208379963e-04]$	3
Schwefel02	3	[-100,100]	0	[0,0,0]	8.27842288585039 2e-08	$[2.034505208379963e-04, -2.034505208379963e-04, -2.034505208379963e-04]$	3
Schwefel04	3	[0,10]	0	[1,1,1]	1.05946567623336 7e-07	$[1.000488281250000, 1.000162760416667, 1.000162760416667]$	3
Schwefel20	3	[-100,100]	0	[0,0,0]	0.00122070312501 4	$[-4.069010416713296e-04, -4.069010416713296e-04, -4.069010416713296e-04]$	3

Schwefel21	3	[-100,100]	0	[0,0,0]	2.034505208379963e-04	[-2.034505208379963e-04,-2.034505208379963e-04,-2.034505208379963e-04]	3
Schwefel22	3	[-100,100]	0	[0,0,0]	6.103515709352360e-04	[-2.034505208379963e-04,-2.034505208379963e-04,-2.034505208379963e-04]	3
Sphere	3	[-1,1]	0	[0,0,0]	2.034505208332412e-07	[-2.604166666666077e-04,-2.604166666666077e-04,-2.604166666666077e-04]	3
StyblinskiTang	3	[-5,5]	-117.49849711131426	[-2.903534018185960,-2.903534018185960,-2.903534018185960]	1.174984969766295e+02	[-2.903483072916667,-2.903483072916667,-2.903483072916667]	3
Whitley	3	[-10.24,10.24]	0	[1,1,1]	1.798561299892754e-14	[0.9998333333333333,0.9998333333333333,0.9998333333333333]	3
Wolfe	3	[0,2]	0	[0,0,0]	2.660199411837491e-04	[2.604166666666667e-04,2.604166666666667e-04,2.604166666666667e-04]	3

XinSheYang01	3	$[-5,5]$	0	$[0,0,0]$	3.64476274069090 -3e-05	$[-1.627604166663752e-04,-1.627604166663752e-04,-1.627604166663752e-04]$	3
XinSheYang02	3	$[-2\pi,2\pi]$	0	$[0,0,0]$	6.13592238148465 -9e-04	$[2.045307717177941e-04,2.045307717177941e-04,2.045307717177941e-04]$	3
XinSheYang03	3	$[-20,20]$	-1	$[0,0,0]$	- 0.99999968210858 6	$[-1.627604166655009e-04,-1.627604166655009e-04,-1.627604166655009e-04]$	3

XinSheYang04	3	[-10,10]	-1	[0,0,0]	- 0.99951170554921 0	[-1.627604166660838e-04,-1.627604166660838e-04,-1.627604166660838e-04]	3
--------------	---	----------	----	---------	----------------------------	--	---

Zacharov	3	[-5,10]	0	[0,0,0]	1.78813934326171 9e-07	[2.441406250000000e-04,2.441406250000000e-04,-2.441406250000000e-04]	3
----------	---	---------	---	---------	---------------------------	--	---

**2. Dimension>3 (Total 64 sample formulas)**

Ackley	4	[-32,32]	0	[0,0,0,0]	0.00196582235748 1	[-4.882812500000000e-04,-4.882812500000000e-04,-4.882812500000000e-04,-4.882812500000000e-04]	3
--------	---	----------	---	-----------	-----------------------	---	---

Ackley	5	[-32,32]	0	[0,0,0,0,0]	0.00196582235748 1	[-4.882812500000000e-04,-4.882812500000000e-04,-4.882812500000000e-04,-4.882812500000000e-04,-4.882812500000000e-04]	3
--------	---	----------	---	-------------	-----------------------	--	---

Brown	4	[-1,4]	0	[0,0,0,0]	5.02914111898174 4e-08	[-9.155273437500000e-05,-9.155273437500000e-05,-9.155273437500000e-05,-9.155273437500000e-05]	3
-------	---	--------	---	-----------	---------------------------	---	---



Mishra02	7	[0,1]	2	[1,1,1,1,1,1,1]	2.00174894070904 6	[0.999877929687500,0.99 9877929687500,0.999877 929687500,0.9998779296 87500,0.99987792968750 0,0.999877929687500,0.9 99877929687500] [0.984375000000000,0.98 4375000000000,0.984375 000000000,0.9843750000 00000,0.98437500000000 0,0.984375000000000,0.9 843750000000000,0.98437 5000000000]	3
Mishra02	8	[0,1]	2	[1,1,1,1,1,1,1, 1]	2.28880142815267 1	[8.999250000000000,8.99 9250000000000,8.999250 000000000,8.9992500000 00000,8.99925000000000 0,8.999250000000000,8.9 992500000000000,8.99925 000000000,8.999250000 00000.8.9992500000000 [-6.103515625000000e- 04,-6.103515625000000e- 04,-6.103515625000000e- 04]	3
Paviani	10	[2.001,9.99 9]	45.7784684 040686	[9.350266,9.3 50266,9.3502 66,9.350266,9 .350266,9.350 266,9.350266, 9.350266,9.35 0266,9.35026 6]	43.1250017758037 10	[8.999250000000000,8.99 9250000000000,8.999250 000000000,8.9992500000 00000,8.99925000000000 0,8.999250000000000,8.9 992500000000000,8.99925 000000000,8.999250000 00000.8.9992500000000 [-6.103515625000000e- 04,-6.103515625000000e- 04,-6.103515625000000e- 04,-6.103515625000000e- 04]	3
Pinter	4	[-10,10]	0	[0,0,0,0]	8.92955658021658 1e-05	[8.999250000000000,8.99 9250000000000,8.999250 000000000,8.9992500000 00000,8.99925000000000 0,8.999250000000000,8.9 992500000000000,8.99925 000000000,8.999250000 00000.8.9992500000000 [-6.103515625000000e- 04,-6.103515625000000e- 04,-6.103515625000000e- 04,-6.103515625000000e- 04]	3
Pinter	5	[-10,10]	0	[0,0,0,0,0]	1.37661815728374 8e-04	[8.999250000000000,8.99 9250000000000,8.999250 000000000,8.9992500000 00000,8.99925000000000 0,8.999250000000000,8.9 992500000000000,8.99925 000000000,8.999250000 00000.8.9992500000000 [-6.103515625000000e- 04,-6.103515625000000e- 04,-6.103515625000000e- 04,-6.103515625000000e- 04]	3









Schwefel20	4	[-100,100]	0	[0,0,0,0]	0.003051757812500	[-7.629394531250000e-04,-7.629394531250000e-04,-7.629394531250000e-04,-7.629394531250000e-04]	3
Schwefel21	4	[-100,100]	0	[0,0,0,0]	7.629394531250000e-04	[-7.629394531250000e-04,-7.629394531250000e-04,-7.629394531250000e-04,-7.629394531250000e-04]	3
Schwefel22	4	[-100,100]	0	[0,0,0,0]	0.003051757812839	[-7.629394531250000e-04,-7.629394531250000e-04,-7.629394531250000e-04,-7.629394531250000e-04]	3
Schwefel22	5	[-100,100]	0	[0,0,0,0,0]	0.001907348632813	[-3.814697265625000e-04,-3.814697265625000e-04,-3.814697265625000e-04,-3.814697265625000e-04,-3.814697265625000e-04]	3
Schwefel22	6	[-100,100]	0	[0,0,0,0,0,0]	0.002288818359375	[-3.814697265625000e-04,-3.814697265625000e-04,-3.814697265625000e-04,-3.814697265625000e-04,-3.814697265625000e-04,-3.814697265625000e-04]	3
Sphere	4	[-1,1]	0	[0,0,0,0]	9.536743164062500e-07	[-4.882812500000000e-04,-4.882812500000000e-04,-4.882812500000000e-04,-4.882812500000000e-04]	3





Sphere	12	[-1,1]	0	[0,0,0,0,0,0,0,0,0,0,0,0]	7.15255737304687 5e-07	[-0.000244140625000000,- 0.000244140625000000,- 0.000244140625000000,- 0.000244140625000000,- 0.000244140625000000,- 0.000244140625000000,- 0.000244140625000000,- 0.000244140625000000,- 0.000244140625000000,- 0.000244140625000000,- 0.000244140625000000,- 0.000244140625000000]	3
StyblinskiTang	4	[-5,5]	- 156.664662 81508568	[- 2.9035340181 85960,- 2.9035340181 - 85960,- 2.9035340181 85960,- 2.9035340181 85960]	- 1.56664662558194 6e+02	[-2.903594970703125,- 2.903594970703125,- 2.903594970703125,- 2.903594970703125]	3

StyblinskiTang	5	[-5,5]	195.830828 5188571	2.9035340181 85960,- 2.9035340181 85960,- 2.9035340181 85960,- 2.9035340181 85960]	1.95830828197743 2e+02	[-2.903594970703125,- 2.903594970703125,- 2.903594970703125,- 2.903594970703125,- 2.903594970703125]	3
StyblinskiTang	6	[-5,5]	234.996994 22262852	2.9035340181 85960,- 2.9035340181 85960,- 2.9035340181 85960,- 2.9035340181 85960]	2.34996966303370 9e+02	[-2.904052734375000,- 2.904052734375000,- 2.904052734375000,- 2.904052734375000,- 2.904052734375000]	3



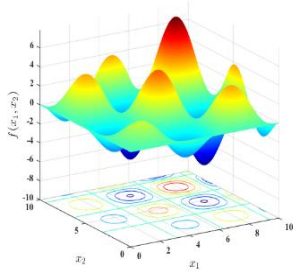
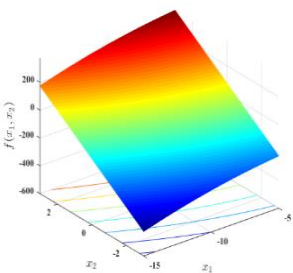




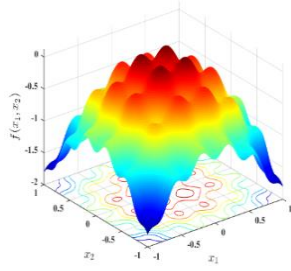


Zacharov	6	[-5,10]	0	[0,0,0,0,0]	0.00213989988039 7	[6.103515625000000e-04,6.103515625000000e-04,0.040893554687500,6.103515625000000e-04,-0.021362304687500,-0.003051757812500]	3
----------	---	---------	---	-------------	-----------------------	---	---

**3. Formula or ground truth errors (Total 52 sample formulas):**

Alpine02		2	[0,10]	-6.1295	[7.917,7.917]	[-6.12950369994330 3;-6.12313240406530 5]	[7.916992187500000,4.816080729166665],[4.799804687499999,7.874674479166666]	3
Bukin02		2	[-15,-5;-3,3]	0	[-10,0]	-4.24720735781987 6e+02	[-14.999674479166666,-2.999804687500000]	3

CosineMixture



2

[-1,1]

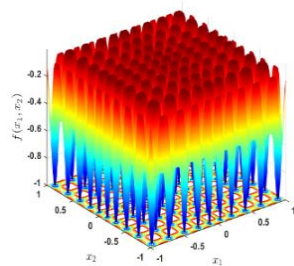
-0.2

[0,0]

```
[-  
1.79896014227814 [-0.9997395833333333,-  
3;- 0.9997395833333333],  
1.79486582584429 [0.997656250000000,-  
9;- 0.9997395833333333], [-  
1.79486582584429 0.9997395833333333,0.997  
9;- 656250000000],  
1.79486582584429 [0.9997395833333333,0.99  
9] 7656250000000]
```

3

Deb01



2

[-1,1]

0

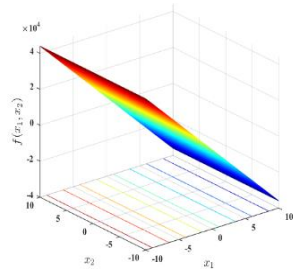
25 solutions

-  
0.99994980171608  
1

3

[-0.900260416666667,-  
0.900260416666667],[-  
0.300260416666667,-  
0.900260416666667],[0.2  
99739583333333,-  
0.900260416666667],[0.8  
99739583333333,-  
0.900260416666667],[-  
0.900260416666667,-  
0.300260416666667],[-  
0.300260416666667,-  
0.300260416666667],[0.2  
99739583333333,-  
0.300260416666667],[0.8  
99739583333333,-  
0.300260416666667],[-  
0.900260416666667,0.299  
739583333333],[-  
0.300260416666667,0.299  
739583333333],[0.299739  
583333333,0.2997395833  
33333],[0.899739583333  
33,0.29973958333333],[-  
0.900260416666667,0.899  
739583333333],[-  
0.300260416666667,0.899  
739583333333],[0.299739  
583333333,0.8997395833  
33333],[0.899739583333  
33 0 8997395833333331

DixonPrice



2

[-10,10]

0

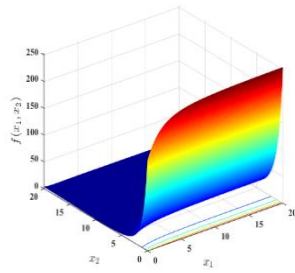
[1, 2<sup>-0.5</sup>]

3.13633665180872  
2e-06

[0.998372395833334,-  
0.706705729166667],  
[0.998372395833334,0.70  
6705729166667]

3

Exp2



2

[0,20]

0

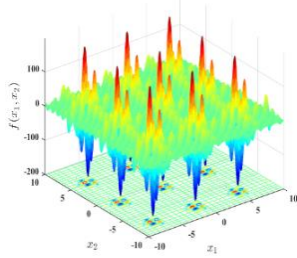
[1,0.1]

6.89559591448113  
4e-08

[1.000325520833333,10.0  
00325520833330]

3

Hansen



2

[-10,10]

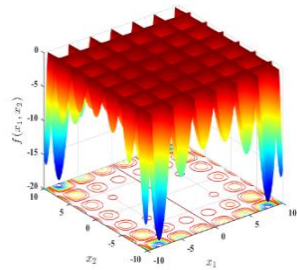
-2.3458

[-7.58989583,-  
7.70831466]

[-  
1.76541539764178 [4.97623697916667,-  
1e+02;- 7.70800781250000],[4.97  
1.76541534975351 623697916667,4.8577473  
3e+02;- 9583333],[  
1.76541532526157 1.30696614583333,-  
7e+02;- 7.70800781250000],[  
1.76541527737331 1.30696614583333,4.8577  
2e+02;- 4739583333],[  
1.76541524771338 7.59016927083334,-  
6e+02;- 7.70800781250000],[7.59  
1.76541519982512 016927083334,4.8577473  
3e+02;- 9583333],[4.97623697916  
1.76541515038984 667,-1.42480468750000],[  
3e+02;- 1.30696614583333,-  
1.76541507800964 1.42480468750000],[  
9e+02;- 7.59016927083334,-  
1.76541500046147 1.42480468750000]  
0e+02]

3

HolderTable



2

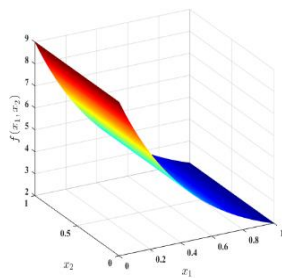
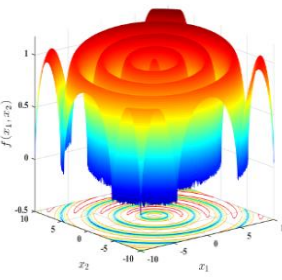
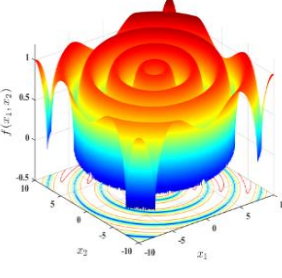
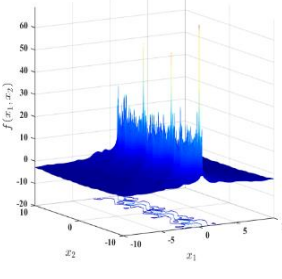
[-10,10]

-  
19.2085025  
6788675

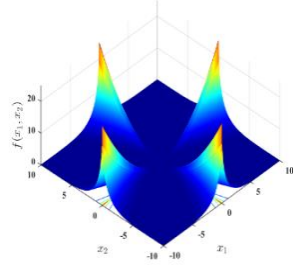
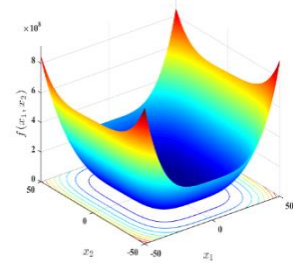
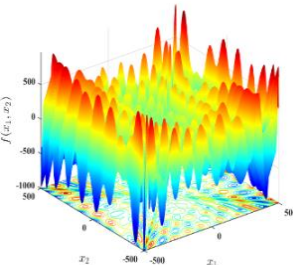
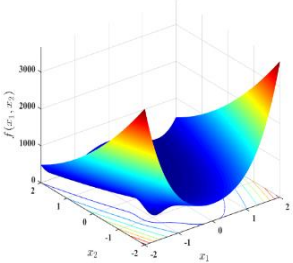
[±9.66459002  
8909654,±9.6  
64590028909  
654]

[-  
19.2085021550660 [-8.055013020833337,-  
9.664388020833334],  
80;-  
19.2085021550660 [8.055013020833336,9.66  
4388020833336],  
80;-  
19.2085021550660 [8.055013020833336,-  
9.664388020833334], [-  
70;-  
19.2085021550660 8.055013020833337,9.664  
388020833336]  
70]

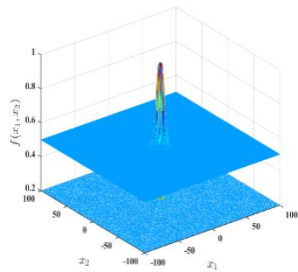
3

Mishra01		2	[0,1]	2	[1,1]	2.00062157825276 8	[0.999739583333333,2.60 4166666666667e- 04],[0.999739583333333, 0.500781250000000]	3
Mishra03		2	[-10,10]	-0.18467	[-10,-10]	- 0.19020811649130 6	[-9.993164062500004,- 9.999674479166668]	4
Mishra04		2	[-10,10]	-0.199409	[-10,-10]	- 0.17734289573452 2	[-8.585611979166666,- 9.176106770833334],[- 9.176106770833334,- 8.585611979166666]	6
Mishra06		2	[-10,10]	-2.28395	[2.88631,1.82 326]	- 3.96270769079990 6	[9.146158854166664,1.85 3841145833334]	3



Mishra11		2	[-10,10]	0	[0,0]	210 solutions and the minimum is 0	210 solutions	3
Price03		2	[-50,50]	0	[±5,±5]	2.13830089723323 8e-07	[0.999959309895836,0.99 9959309895836]	5
Rana		2	[-500,500]	-928.5478	[-500,-500]	-9.63223958664999 1e+02	[-4.999997466868485e+02, 4.961112985996445e+02]	6
RosenbrockModified		2	[-2,2]	34.37	[-0.9,-0.95]	34.0404176415371 50	[-0.909635416666667,- 0.950781250000000]	3

Schaffer04



2

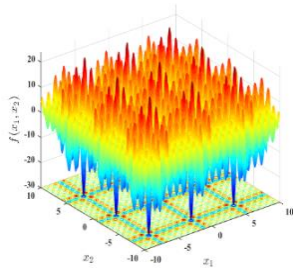
[-100,100] 0.292579 [0,1.253115]

0.29243848717561  
3

[-2.034505208379963e-04,-1.253051757812504],[1.253051757812504,-2.034505208379963e-04],[1.253051757812504,-2.034505208379963e-04],[1.253051757812504,-2.034505208379963e-04]

6

Shubert03



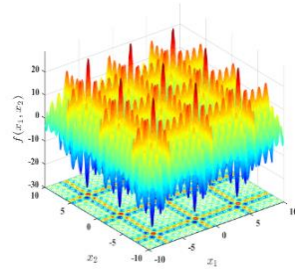
2

[-10,10] -24.062499 [5.791794,5.791794](and many others)

[-29.6758932042555,29.6758932042555],[5.16894531250000,5.16894531250000],[5.16894531250000,29.6758932042555],[5.16894531250000,29.6758932042555]

3

Shubert04



2

[-10,10]

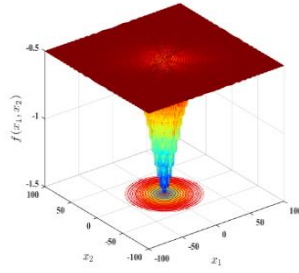
-29.016015

[-0.80032121,-  
7.08350592](  
and many  
others)

[-7.70800781250000,-  
25.7417409229229 7.70800781250000],[-  
40;- 7.70800781250000,4.8577  
25.7417405737905 4739583333],[4.85774739  
65;- 583333,-  
25.7417405737905 7.70800781250000],[4.85  
60;- 774739583333,4.8577473  
25.7417402246581 9583333],[-  
80;- 7.70800781250000,-  
25.7417391203173 1.42480468750000],[-  
55;- 1.42480468750000,-  
25.7417391203173 7.70800781250000],[-  
50;- 1.42480468750000,4.8577  
25.7417387711849 4739583333],[4.85774739  
77;- 583333,-  
25.7417387711849 1.42480468750000],[-  
70;- 1.42480468750000 -

3

SineEnvelope



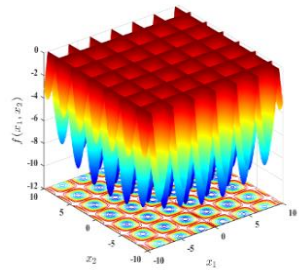
2

[-100,100] 0 [0,0]

[-0.505981445312505,-  
 1.49149528588963 2.00378417968751],[-  
 ,- 2.00378417968751,-  
 1.49149528588963 0.505981445312505],[-  
 ,- 1.29943847656250,-  
 1.49149528588963 1.60705566406250],[0.50  
 ,- 5981445312505,-  
 1.49149528588963 2.00378417968751],[1.29  
 ,- 943847656250,-  
 1.49149528588963 1.60705566406250],[2.00  
 ,- 378417968751,-  
 1.49149528588963 0.505981445312505],[-  
 ,- 2.00378417968751,0.5059  
 1.49149528588963 81445312505],[-  
 ,- 1.60705566406250,1.2994  
 1.49149528588963 3847656250],[-  
 ,- 0.505981445312505,2.003  
 1.49149528588963 78417968751],[1.6070556  
 ,- 6406250,1.299438476562  
 1.49149528588963 50],[2.00378417968751,0.  
 ,- 505981445312505],[0.505  
 1.49149528588963 981445312505,2.0037841  
 70687511]

6

TestTubeHold  
er



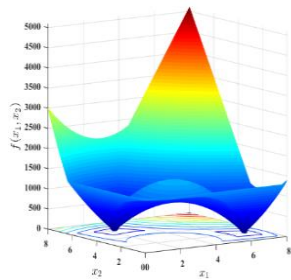
2

[-10,10] 10.8722999 [-0.5π,0]  
01558

- [-1.570638020833333,-  
 - 3.255208333327505e-  
 10.8722995226990 04],[1.570638020833333,-  
 59 3.255208333327505e-04]

3

Zimmerman



2

[0,100]

0

[7,2]

0.04207356770833 [6.978963216145834,1.97  
2 8963216145834]

3

CosineMixture

3

[-1,1]

-0.3

[0,0,0]

-  
2.69844021341721 9583333333,-  
5 0.999739583333333],[  
0.999739583333333,-  
0.999739583333333,0.999  
739583333333],[0.999739  
5833333333,-  
0.999739583333333,0.999  
739583333333],[  
0.999739583333333,0.999  
739583333333,0.9997395  
833333333],[0.9997395833

3

CosineMixture

4

[-1,1]

-0.4

[0,0,0,0]

-  
3.59610646910193

[-0.999511718750000,-  
0.999511718750000,-  
0.999511718750000,-  
0.999511718750000],[0.9  
99511718750000,-  
0.999511718750000,-  
0.999511718750000,-  
0.999511718750000],[-  
0.999511718750000,0.999  
511718750000,-  
0.999511718750000,-  
0.999511718750000],[0.9  
99511718750000,0.99951  
1718750000,-  
0.999511718750000,-  
0.999511718750000],[-  
0.999511718750000,-  
0.999511718750000,0.999  
511718750000,-  
0.999511718750000],[0.9  
99511718750000,-

3

CosineMixture

5

[-1,1]

-0.5

[0,0,0,0,0]

-  
4.49513308637741

32 solutions

3

CosineMixture

6

[-1,1]

-0.6

[0,0,0,0,0,0]

-

5.39415970365289

64 solutions

3



CosineMixture

7

[-1,1]

-0.7

[0,0,0,0,0,0]

6.29318632092837

128 solutions

3

CosineMixture

8

[-1,1]

-0.8

[0,0,0,0,0,0,  
0]

-  
7.19221293820385

256 solutions

3

CosineMixture

9

[-1,1]

-0.9

[0,0,0,0,0,0,0,  
0,0]

-  
8.09123955547934

512 solutions

3

CosineMixture	10	[-1,1]	-1	[0,0,0,0,0,0,0,0,0,0,0,0]	-8.99026617275482	1024 solutions	3
Deb01	3	[-1,1]	-1	125 solutions	-0.99994980171608	64 solutions	3
Deb01	4	[-1,1]	-1	625 solutions	-0.99997882259158	121 solutions and the minimum is -	3
Deb01	5	[-1,1]	-1	3125 solutions	-0.99998164621946	351 solutions	3

DixonPrice	3	[-10,10]	0	$[1, 2^{-0.5}, 2^{-0.75}]$	0.003910017602238	[1.062499999999999,0.7291666666666667,-0.6041666666666667],[1.062499999999999,0.7291666666666667,0.6041666666666667]	3
Dolan	5	[-100,100]	0.00001	$[8.39045925, 4.81424707, 7.3454133, 68.88246895, 3.85470806]$	4.543551894144404e+02	[23.568344116210938, 99.9999618530273440, 99.9999618530273440,-98.437118530273440,-0.496292114257813]	3
Mishra01	3	[0,1]	2	$[1,1,1]$	2.001243451456134	[0.999739583333333,0.999739583333333,2.604166666666667e-04;0.999739583333333,0.999739583333333,0.500781250000000]	3
Mishra01	4	[0,1]	2	$[1,1,1,1]$	2.001748940709046	[0.999755859375000,0.999755859375000,0.999755859375000,2.441406250000000e-04;0.999755859375000,0.999755859375000,0.999755859375000,0.500732421875000]	3



Rana	3	[- 500.000001 ,500.00000 1]	-928.5478	[-500,-500]	- 1.45560919321837 4e+03	[- 4.997395843328125e+02, 4.955729176578125e+02, 4.955729176578125e+02]	3
Shekel05	4	[0,10]	-10.1527	[4,4,4,4]	- 10.1531987390095 29	[4.000091552734375,4.00 0091552734375,4.000091 552734375,4.0000915527 34375]	3
Shekel07	4	[0,10]	-10.3999	[4,4,4,4]	- 10.4029373207194 67	[4.000701904296875,4.00 0701904296875,3.999481 201171875,3.9994812011 71875]	3
Shekel10	4	[0,10]	-10.5319	[4,4,4,4]	- 10.5364068341446 71	[4.000701904296875,4.00 0701904296875,3.999786 376953125,3.9994812011 71875]	3





