

# IE 310: Homework 6 — Due: June 26<sup>st</sup> 23:59

*Note: You need to report your initial point(s) and value(s), point(s) and value(s) at each iteration, and final local optimum point and value in a spreadsheet table preferably. Summarize your answers in a brief report which includes your tables for each method and include your source code. Please name your folder as “Name-Surname-ID-Assigment6”. Submit your folders via Moodle page until due time.*

Golden Section Interval : (-9,2)

Initial point : (6,34)

## 1. Cyclic Coordinate

Cyclic Coordinate							
k	x f(x)	j	d	y(j)	landa	y(j+1)	
1	(6.000000 , 34.000000)	1	(1 , 0)	(6.000000 , 34.000000)	0.639836	(6.639836 , 34.000000)	
1	222.000000	2	(0 , 1)	(6.639836 , 33.992883)	-0.001580	(6.638256 , 33.992883)	
2	(6.639836 , 33.992883)	1	(1 , 0)	(6.638256 , 33.992883)	-0.007842	(6.638256 , 33.985041)	
2	-27.420997	2	(0 , 1)	(6.638256 , 33.985041)	-0.001580	(6.636676 , 33.985041)	
3	(6.638256 , 33.985041)	1	(1 , 0)	(6.636676 , 33.985041)	-0.007842	(6.636676 , 33.977199)	
3	-27.421436	2	(0 , 1)	(6.636676 , 33.977199)	-0.001580	(6.635096 , 33.977199)	
4	(6.636676 , 33.977199)	1	(1 , 0)	(6.635096 , 33.977199)	-0.008129	(6.635096 , 33.969070)	
4	-27.421870	2	(0 , 1)	(6.635096 , 33.977199)	-0.001580	(6.633516 , 33.969070)	
5	(6.635096 , 33.969070)	1	(1 , 0)	(6.635096 , 33.969070)	-0.007842	(6.633516 , 33.961228)	
5	-27.422300	2	(0 , 1)	(6.633516 , 33.969070)	-0.001580	(6.631935 , 33.961228)	
6	(6.633516 , 33.961228)	1	(1 , 0)	(6.633516 , 33.961228)	-0.007842	(6.631935 , 33.953385)	
6	-27.422724	2	(0 , 1)	(6.631935 , 33.961228)	-0.001580	(6.630355 , 33.953385)	
7	(6.631935 , 33.953385)	1	(1 , 0)	(6.631935 , 33.953385)	-0.007842	(6.630355 , 33.945543)	
7	-27.423144	2	(0 , 1)	(6.630355 , 33.953385)	-0.001580	(6.629218 , 33.945543)	
8	(6.630355 , 33.945543)	1	(1 , 0)	(6.630355 , 33.945543)	-0.00137	(6.629218 , 33.945543)	
8	-27.423558	2	(0 , 1)	(6.629218 , 33.945543)	-0.005938	(6.629218 , 33.939604)	
9	(6.629218 , 33.939604)	1	(1 , 0)	(6.629218 , 33.939604)	-0.001580	(6.627638 , 33.939604)	
9	-27.423853	2	(0 , 1)	(6.627638 , 33.939604)	-0.007842	(6.627638 , 33.931762)	
10	(6.627638 , 33.931762)	1	(1 , 0)	(6.627638 , 33.931762)	-0.00137	(6.626501 , 33.931762)	
10	-27.424259	2	(0 , 1)	(6.626501 , 33.931762)	-0.005490	(6.626501 , 33.926272)	
11	(6.626501 , 33.926272)	1	(1 , 0)	(6.626501 , 33.926272)	-0.00137	(6.625365 , 33.926272)	
11	-27.424548	2	(0 , 1)	(6.625365 , 33.926272)	-0.005938	(6.625365 , 33.920333)	
12	(6.625365 , 33.920333)	1	(1 , 0)	(6.625365 , 33.920333)	-0.00137	(6.624228 , 33.920333)	
12	-27.424834	2	(0 , 1)	(6.624228 , 33.920333)	-0.005490	(6.624228 , 33.914843)	
13	(6.624228 , 33.914843)	1	(1 , 0)	(6.624228 , 33.914843)	-0.00137	(6.623091 , 33.914843)	
13	-27.425118	2	(0 , 1)	(6.623091 , 33.914843)	-0.005490	(6.623091 , 33.909353)	
14	(6.623091 , 33.909353)	1	(1 , 0)	(6.623091 , 33.909353)	-0.00137	(6.621954 , 33.909353)	
14	-27.425399	2	(0 , 1)	(6.621954 , 33.909353)	-0.005938	(6.621954 , 33.903415)	
15	(6.621954 , 33.903415)	1	(1 , 0)	(6.621954 , 33.903415)	-0.00137	(6.620817 , 33.903415)	
15	-27.425678	2	(0 , 1)	(6.620817 , 33.903415)	-0.005490	(6.620817 , 33.897925)	
16	(6.620817 , 33.897925)	1	(1 , 0)	(6.620817 , 33.897925)	-0.00137	(6.619681 , 33.897925)	
16	-27.425954	2	(0 , 1)	(6.619681 , 33.897925)	-0.005938	(6.619681 , 33.891986)	
17	(6.619681 , 33.891986)	1	(1 , 0)	(6.619681 , 33.891986)	-0.00137	(6.618544 , 33.891986)	
17	-27.426227	2	(0 , 1)	(6.618544 , 33.891986)	-0.005490	(6.618544 , 33.886496)	
18	(6.618544 , 33.886496)	1	(1 , 0)	(6.618544 , 33.886496)	-0.00137	(6.617407 , 33.886496)	
18	-27.426498	2	(0 , 1)	(6.617407 , 33.886496)	-0.005938	(6.617407 , 33.880558)	
19	(6.617407 , 33.880558)	1	(1 , 0)	(6.617407 , 33.880558)	-0.00137	(6.616270 , 33.880558)	
19	-27.426766	2	(0 , 1)	(6.616270 , 33.880558)	-0.005490	(6.616270 , 33.875068)	
20	(6.616270 , 33.875068)	1	(1 , 0)	(6.616270 , 33.875068)	-0.001137	(6.615133 , 33.875068)	
20	-27.427032	2	(0 , 1)	(6.615133 , 33.875068)	-0.005490	(6.615133 , 33.869578)	
21	(6.615133 , 33.869578)	1	(1 , 0)	(6.615133 , 33.869578)	-0.001137	(6.613996 , 33.869578)	
21	-27.427295	2	(0 , 1)	(6.613996 , 33.869578)	-0.005938	(6.613996 , 33.863639)	
22	(6.613996 , 33.863639)	1	(1 , 0)	(6.613996 , 33.863639)	-0.001137	(6.612860 , 33.863639)	
22	-27.427556	2	(0 , 1)	(6.612860 , 33.863639)	-0.005490	(6.612860 , 33.858149)	
23	(6.612860 , 33.858149)	1	(1 , 0)	(6.612860 , 33.858149)	-0.001137	(6.611723 , 33.858149)	
23	-27.427813	2	(0 , 1)	(6.611723 , 33.858149)	-0.005938	(6.611723 , 33.852211)	
24	(6.611723 , 33.852211)	1	(1 , 0)	(6.611723 , 33.852211)	-0.001137	(6.610586 , 33.852211)	
24	-27.428069	2	(0 , 1)	(6.610586 , 33.852211)	-0.005490	(6.610586 , 33.846721)	
25	(6.610586 , 33.846721)	1	(1 , 0)	(6.610586 , 33.846721)	-0.001137	(6.609449 , 33.846721)	
25	-27.428321	2	(0 , 1)	(6.609449 , 33.846721)	-0.005938	(6.609449 , 33.840782)	
26	(6.609449 , 33.840782)	1	(1 , 0)	(6.609449 , 33.840782)	-0.001137	(6.608312 , 33.840782)	
26	-27.428572	2	(0 , 1)	(6.608312 , 33.840782)	-0.005490	(6.608312 , 33.835292)	
27	(6.608312 , 33.835292)	1	(1 , 0)	(6.608312 , 33.835292)	-0.001137	(6.607176 , 33.835292)	
27	-27.428819	2	(0 , 1)	(6.607176 , 33.835292)	-0.005490	(6.607176 , 33.829802)	
28	(6.607176 , 33.829802)	1	(1 , 0)	(6.607176 , 33.829802)	-0.001137	(6.606039 , 33.829802)	
28	-27.429064	2	(0 , 1)	(6.606039 , 33.829802)	-0.005938	(6.606039 , 33.823864)	
29	(6.606039 , 33.823864)	1	(1 , 0)	(6.606039 , 33.823864)	-0.001137	(6.604902 , 33.823864)	
29	-27.429307	2	(0 , 1)	(6.604902 , 33.823864)	-0.005490	(6.604902 , 33.818374)	
30	(6.604902 , 33.818374)	1	(1 , 0)	(6.604902 , 33.818374)	-0.001137	(6.603765 , 33.818374)	
30	-27.429546	2	(0 , 1)	(6.603765 , 33.818374)	-0.005938	(6.603765 , 33.812435)	
31	(6.603765 , 33.812435)	1	(1 , 0)	(6.603765 , 33.812435)	-0.001137	(6.602628 , 33.812435)	
31	-27.429784	2	(0 , 1)	(6.602628 , 33.812435)	-0.005490	(6.602628 , 33.806945)	
32	(6.602628 , 33.806945)	1	(1 , 0)	(6.602628 , 33.806945)	-0.001137	(6.601492 , 33.806945)	
32	-27.430018	2	(0 , 1)	(6.601492 , 33.806945)	-0.005938	(6.601492 , 33.801007)	

33	(6.601492 , 33.801007)	1	(1 , 0)	(6.601492 , 33.801007)	-0.001137	(6.600355 , 33.801007)
33	-27.430250	2	(0 , 1)	(6.600355 , 33.795517)	-0.0005490	(6.600355 , 33.795517)
34	(6.600355 , 33.795517)	1	(1 , 0)	(6.600355 , 33.795517)	-0.001137	(6.599218 , 33.795517)
34	-27.430480	2	(0 , 1)	(6.599218 , 33.795517)	-0.0005938	(6.599218 , 33.789579)
35	(6.599218 , 33.789579)	1	(1 , 0)	(6.599218 , 33.789579)	-0.001137	(6.598081 , 33.789579)
35	-27.430706	2	(0 , 1)	(6.598081 , 33.789579)	-0.0005490	(6.598081 , 33.784088)
36	(6.598081 , 33.784088)	1	(1 , 0)	(6.598081 , 33.784088)	-0.001137	(6.596944 , 33.784088)
36	-27.430931	2	(0 , 1)	(6.596944 , 33.784088)	-0.0005490	(6.596944 , 33.778598)
37	(6.596944 , 33.778598)	1	(1 , 0)	(6.596944 , 33.778598)	-0.001091	(6.595853 , 33.778598)
37	-27.431152	2	(0 , 1)	(6.595853 , 33.778598)	-0.0005490	(6.595853 , 33.773108)
38	(6.595853 , 33.773108)	1	(1 , 0)	(6.595853 , 33.773108)	-0.001091	(6.594761 , 33.773108)
38	-27.431363	2	(0 , 1)	(6.594761 , 33.773108)	-0.0005490	(6.594761 , 33.767618)
39	(6.594761 , 33.767618)	1	(1 , 0)	(6.594761 , 33.767618)	-0.001091	(6.593670 , 33.767618)
39	-27.431571	2	(0 , 1)	(6.593670 , 33.767618)	-0.0005490	(6.593670 , 33.762128)
40	(6.593670 , 33.762128)	1	(1 , 0)	(6.593670 , 33.762128)	-0.001091	(6.592578 , 33.762128)
40	-27.431777	2	(0 , 1)	(6.592578 , 33.762128)	-0.0005490	(6.592578 , 33.756638)
41	(6.592578 , 33.756638)	1	(1 , 0)	(6.592578 , 33.756638)	-0.001091	(6.591487 , 33.756638)
41	-27.431980	2	(0 , 1)	(6.591487 , 33.756638)	-0.0005490	(6.591487 , 33.751148)
42	(6.591487 , 33.751148)	1	(1 , 0)	(6.591487 , 33.751148)	-0.000807	(6.590679 , 33.751148)
42	-27.432181	2	(0 , 1)	(6.590679 , 33.751148)	-0.0004029	(6.590679 , 33.747119)
43	(6.590679 , 33.747119)	1	(1 , 0)	(6.590679 , 33.747119)	-0.000807	(6.589872 , 33.747119)
43	-27.432328	2	(0 , 1)	(6.589872 , 33.747119)	-0.004029	(6.589872 , 33.743089)
44	(6.589872 , 33.743089)	1	(1 , 0)	(6.589872 , 33.743089)	-0.000807	(6.589065 , 33.743089)
44	-27.432474	2	(0 , 1)	(6.589065 , 33.743089)	-0.004029	(6.589065 , 33.739060)
45	(6.589065 , 33.739060)	1	(1 , 0)	(6.589065 , 33.739060)	-0.000807	(6.588257 , 33.739060)
45	-27.432618	2	(0 , 1)	(6.588257 , 33.739060)	-0.004029	(6.588257 , 33.735031)
46	(6.588257 , 33.735031)	1	(1 , 0)	(6.588257 , 33.735031)	-0.000807	(6.587450 , 33.735031)
46	-27.432761	2	(0 , 1)	(6.587450 , 33.735031)	-0.004029	(6.587450 , 33.731001)
47	(6.587450 , 33.731001)	1	(1 , 0)	(6.587450 , 33.731001)	-0.000807	(6.586642 , 33.731001)
47	-27.432903	2	(0 , 1)	(6.586642 , 33.731001)	-0.004029	(6.586642 , 33.726972)
48	(6.586642 , 33.726972)	1	(1 , 0)	(6.586642 , 33.726972)	-0.000807	(6.585835 , 33.726972)
48	-27.433044	2	(0 , 1)	(6.585835 , 33.726972)	-0.004029	(6.585835 , 33.722943)
49	(6.585835 , 33.722943)	1	(1 , 0)	(6.585835 , 33.722943)	-0.000807	(6.585027 , 33.722943)
49	-27.433183	2	(0 , 1)	(6.585027 , 33.722943)	-0.004029	(6.585027 , 33.718913)
50	(6.585027 , 33.718913)	1	(1 , 0)	(6.585027 , 33.718913)	-0.000807	(6.584220 , 33.718913)
50	-27.433321	2	(0 , 1)	(6.584220 , 33.718913)	-0.004029	(6.584220 , 33.714884)
51	(6.584220 , 33.714884)	1	(1 , 0)	(6.584220 , 33.714884)	-0.000807	(6.583412 , 33.714884)
51	-27.433458	2	(0 , 1)	(6.583412 , 33.714884)	-0.004029	(6.583412 , 33.701855)
52	(6.583412 , 33.701855)	1	(1 , 0)	(6.583412 , 33.701855)	-0.000807	(6.582605 , 33.701855)
52	-27.433593	2	(0 , 1)	(6.582605 , 33.701855)	-0.004029	(6.582605 , 33.706825)
53	(6.582605 , 33.706825)	1	(1 , 0)	(6.582605 , 33.706825)	-0.000807	(6.581797 , 33.706825)
53	-27.433727	2	(0 , 1)	(6.581797 , 33.706825)	-0.004029	(6.581797 , 33.702796)
54	(6.581797 , 33.702796)	1	(1 , 0)	(6.581797 , 33.702796)	-0.000807	(6.580990 , 33.702796)
54	-27.433860	2	(0 , 1)	(6.580990 , 33.702796)	-0.004029	(6.580990 , 33.698767)
55	(6.580990 , 33.698767)	1	(1 , 0)	(6.580990 , 33.698767)	-0.000807	(6.580182 , 33.698767)
55	-27.433991	2	(0 , 1)	(6.580182 , 33.698767)	-0.004029	(6.580182 , 33.694737)
56	(6.580182 , 33.694737)	1	(1 , 0)	(6.580182 , 33.694737)	-0.000807	(6.579375 , 33.694737)
56	-27.434121	2	(0 , 1)	(6.579375 , 33.694737)	-0.004029	(6.579375 , 33.690708)
57	(6.579375 , 33.690708)	1	(1 , 0)	(6.579375 , 33.690708)	-0.000807	(6.578568 , 33.690708)
57	-27.434250	2	(0 , 1)	(6.578568 , 33.690708)	-0.004029	(6.578568 , 33.686679)
58	(6.578568 , 33.686679)	1	(1 , 0)	(6.578568 , 33.686679)	-0.000807	(6.577760 , 33.686679)
58	-27.434378	2	(0 , 1)	(6.577760 , 33.686679)	-0.004316	(6.577760 , 33.682362)
59	(6.577760 , 33.682362)	1	(1 , 0)	(6.577760 , 33.682362)	-0.000807	(6.576953 , 33.682362)
59	-27.434504	2	(0 , 1)	(6.576953 , 33.682362)	-0.004029	(6.576953 , 33.678333)
60	(6.576953 , 33.678333)	1	(1 , 0)	(6.576953 , 33.678333)	-0.000807	(6.576145 , 33.678333)
60	-27.434629	2	(0 , 1)	(6.576145 , 33.678333)	-0.004029	(6.576145 , 33.674303)
61	(6.576145 , 33.674303)	1	(1 , 0)	(6.576145 , 33.674303)	-0.000807	(6.575338 , 33.674303)
61	-27.434753	2	(0 , 1)	(6.575338 , 33.674303)	-0.004029	(6.575338 , 33.670274)
62	(6.575338 , 33.670274)	1	(1 , 0)	(6.575338 , 33.670274)	-0.000807	(6.574530 , 33.670274)
62	-27.434875	2	(0 , 1)	(6.574530 , 33.670274)	-0.004029	(6.574530 , 33.666245)
63	(6.574530 , 33.666245)	1	(1 , 0)	(6.574530 , 33.666245)	-0.000807	(6.573723 , 33.666245)
63	-27.434996	2	(0 , 1)	(6.573723 , 33.666245)	-0.004029	(6.573723 , 33.662215)
64	(6.573723 , 33.662215)	1	(1 , 0)	(6.573723 , 33.662215)	-0.000807	(6.572915 , 33.662215)
64	-27.435116	2	(0 , 1)	(6.572915 , 33.662215)	-0.004029	(6.572915 , 33.658186)
65	(6.572915 , 33.658186)	1	(1 , 0)	(6.572915 , 33.658186)	-0.000807	(6.572108 , 33.658186)
65	-27.435234	2	(0 , 1)	(6.572108 , 33.658186)	-0.004029	(6.572108 , 33.654157)
66	(6.572108 , 33.654157)	1	(1 , 0)	(6.572108 , 33.654157)	-0.000807	(6.571300 , 33.654157)
66	-27.435351	2	(0 , 1)	(6.571300 , 33.654157)	-0.004029	(6.571300 , 33.650127)
67	(6.571300 , 33.650127)	1	(1 , 0)	(6.571300 , 33.650127)	-0.000807	(6.570493 , 33.650127)

67	-27.435467	2	(0 , 1)	(6.570493 , 33.650127)	-0.004029	(6.570493 , 33.646098)
68	(6.570493 , 33.646098)	1	(1 , 0)	(6.570493 , 33.646098)	-0.000807	(6.569686 , 33.642069)
68	-27.435582	2	(0 , 1)	(6.569686 , 33.646098)	-0.004029	(6.569686 , 33.642069)
69	(6.569686 , 33.642069)	1	(1 , 0)	(6.569686 , 33.642069)	-0.000807	(6.568878 , 33.642069)
69	-27.435695	2	(0 , 1)	(6.568878 , 33.642069)	-0.004029	(6.568878 , 33.638039)
70	(6.568878 , 33.638039)	1	(1 , 0)	(6.568878 , 33.638039)	-0.000807	(6.568071 , 33.638039)
70	-27.435807	2	(0 , 1)	(6.568071 , 33.638039)	-0.004029	(6.568071 , 33.634010)
71	(6.568071 , 33.634010)	1	(1 , 0)	(6.568071 , 33.634010)	-0.000807	(6.567263 , 33.634010)
71	-27.435917	2	(0 , 1)	(6.567263 , 33.634010)	-0.004029	(6.567263 , 33.629981)
72	(6.567263 , 33.629981)	1	(1 , 0)	(6.567263 , 33.629981)	-0.000807	(6.566456 , 33.629981)
72	-27.436026	2	(0 , 1)	(6.566456 , 33.629981)	-0.004029	(6.566456 , 33.625951)
73	(6.566456 , 33.625951)	1	(1 , 0)	(6.566456 , 33.625951)	-0.000807	(6.565648 , 33.625951)
73	-27.436134	2	(0 , 1)	(6.565648 , 33.625951)	-0.004029	(6.565648 , 33.621922)
74	(6.565648 , 33.621922)	1	(1 , 0)	(6.565648 , 33.621922)	-0.000807	(6.564841 , 33.621922)
74	-27.436241	2	(0 , 1)	(6.564841 , 33.621922)	-0.004029	(6.564841 , 33.617893)
75	(6.564841 , 33.617893)	1	(1 , 0)	(6.564841 , 33.617893)	-0.000807	(6.564033 , 33.617893)
75	-27.436346	2	(0 , 1)	(6.564033 , 33.617893)	-0.004029	(6.564033 , 33.613863)
76	(6.564033 , 33.613863)	1	(1 , 0)	(6.564033 , 33.613863)	-0.000807	(6.563226 , 33.613863)
76	-27.436451	2	(0 , 1)	(6.563226 , 33.613863)	-0.004029	(6.563226 , 33.609834)
77	(6.563226 , 33.609834)	1	(1 , 0)	(6.563226 , 33.609834)	-0.000807	(6.562418 , 33.609834)
77	-27.436553	2	(0 , 1)	(6.562418 , 33.609834)	-0.004029	(6.562418 , 33.605805)
78	(6.562418 , 33.605805)	1	(1 , 0)	(6.562418 , 33.605805)	-0.000807	(6.561611 , 33.605805)
78	-27.436655	2	(0 , 1)	(6.561611 , 33.605805)	-0.004029	(6.561611 , 33.601775)
79	(6.561611 , 33.601775)	1	(1 , 0)	(6.561611 , 33.601775)	-0.000807	(6.560803 , 33.601775)
79	-27.436755	2	(0 , 1)	(6.560803 , 33.601775)	-0.004029	(6.560803 , 33.597746)
80	(6.560803 , 33.597746)	1	(1 , 0)	(6.560803 , 33.597746)	-0.000807	(6.559996 , 33.597746)
80	-27.436854	2	(0 , 1)	(6.559996 , 33.597746)	-0.004029	(6.559996 , 33.593716)
81	(6.559996 , 33.593716)	1	(1 , 0)	(6.559996 , 33.593716)	-0.000807	(6.559189 , 33.593716)
81	-27.436951	2	(0 , 1)	(6.559189 , 33.593716)	-0.004029	(6.559189 , 33.589687)
82	(6.559189 , 33.589687)	1	(1 , 0)	(6.559189 , 33.589687)	-0.000807	(6.558381 , 33.589687)
82	-27.437047	2	(0 , 1)	(6.558381 , 33.589687)	-0.004029	(6.558381 , 33.585658)
83	(6.558381 , 33.585658)	1	(1 , 0)	(6.558381 , 33.585658)	-0.000807	(6.557574 , 33.585658)
83	-27.437142	2	(0 , 1)	(6.557574 , 33.585658)	-0.004029	(6.557574 , 33.581628)
84	(6.557574 , 33.581628)	1	(1 , 0)	(6.557574 , 33.581628)	-0.000366	(6.557208 , 33.581628)
84	-27.437236	2	(0 , 1)	(6.557208 , 33.581628)	-0.001682	(6.557208 , 33.579947)
85	(6.557208 , 33.579947)	1	(1 , 0)	(6.557208 , 33.579947)	-0.000366	(6.556842 , 33.579947)
85	-27.437278	2	(0 , 1)	(6.556842 , 33.579947)	-0.002122	(6.556842 , 33.577824)
86	(6.556842 , 33.577824)	1	(1 , 0)	(6.556842 , 33.577824)	-0.000807	(6.556035 , 33.577824)
86	-27.437320	2	(0 , 1)	(6.556035 , 33.577824)	-0.004029	(6.556035 , 33.573795)
87	(6.556035 , 33.573795)	1	(1 , 0)	(6.556035 , 33.573795)	-0.000807	(6.555227 , 33.573795)
87	-27.437411	2	(0 , 1)	(6.555227 , 33.573795)	-0.004029	(6.555227 , 33.569766)
88	(6.555227 , 33.569766)	1	(1 , 0)	(6.555227 , 33.569766)	-0.000366	(6.554862 , 33.569766)
88	-27.437501	2	(0 , 1)	(6.554862 , 33.569766)	-0.001682	(6.554862 , 33.568084)
89	(6.554862 , 33.568084)	1	(1 , 0)	(6.554862 , 33.568084)	-0.000366	(6.554496 , 33.568084)
89	-27.437541	2	(0 , 1)	(6.554496 , 33.568084)	-0.001682	(6.554496 , 33.566402)
90	(6.554496 , 33.566402)	1	(1 , 0)	(6.554496 , 33.566402)	-0.000366	(6.554130 , 33.566402)
90	-27.437581	2	(0 , 1)	(6.554130 , 33.566402)	-0.002122	(6.554130 , 33.564280)
91	(6.554130 , 33.564280)	1	(1 , 0)	(6.554130 , 33.564280)	-0.000366	(6.553765 , 33.564280)
91	-27.437621	2	(0 , 1)	(6.553765 , 33.564280)	-0.001682	(6.553765 , 33.562598)
92	(6.553765 , 33.562598)	1	(1 , 0)	(6.553765 , 33.562598)	-0.000366	(6.553399 , 33.562598)
92	-27.437660	2	(0 , 1)	(6.553399 , 33.562598)	-0.001682	(6.553399 , 33.560916)
93	(6.553399 , 33.560916)	1	(1 , 0)	(6.553399 , 33.560916)	-0.000366	(6.553033 , 33.560916)
93	-27.437699	2	(0 , 1)	(6.553033 , 33.560916)	-0.002122	(6.553033 , 33.558794)
94	(6.553033 , 33.558794)	1	(1 , 0)	(6.553033 , 33.558794)	-0.000366	(6.552668 , 33.558794)
94	-27.437738	2	(0 , 1)	(6.552668 , 33.558794)	-0.001682	(6.552668 , 33.557112)
95	(6.552668 , 33.557112)	1	(1 , 0)	(6.552668 , 33.557112)	-0.000366	(6.552302 , 33.557112)
95	-27.437777	2	(0 , 1)	(6.552302 , 33.557112)	-0.001682	(6.552302 , 33.555431)
96	(6.552302 , 33.555431)	1	(1 , 0)	(6.552302 , 33.555431)	-0.000366	(6.551936 , 33.555431)
96	-27.437815	2	(0 , 1)	(6.551936 , 33.555431)	-0.002122	(6.551936 , 33.553308)
97	(6.551936 , 33.553308)	1	(1 , 0)	(6.551936 , 33.553308)	-0.000366	(6.551571 , 33.553308)
97	-27.437853	2	(0 , 1)	(6.551571 , 33.553308)	-0.001682	(6.551571 , 33.551627)
98	(6.551571 , 33.551627)	1	(1 , 0)	(6.551571 , 33.551627)	-0.000366	(6.551205 , 33.551627)
98	-27.437891	2	(0 , 1)	(6.551205 , 33.551627)	-0.001682	(6.551205 , 33.549945)
99	(6.551205 , 33.549945)	1	(1 , 0)	(6.551205 , 33.549945)	-0.000366	(6.550839 , 33.549945)
99	-27.437929	2	(0 , 1)	(6.550839 , 33.549945)	-0.002122	(6.550839 , 33.547823)
100	(6.550839 , 33.547823)	1	(1 , 0)	(6.550839 , 33.547823)	-0.000366	(6.550474 , 33.547823)
100	-27.437966	2	(0 , 1)	(6.550474 , 33.547823)	-0.001682	(6.550474 , 33.546141)
101	(6.550474 , 33.546141)	1	(1 , 0)	(6.550474 , 33.546141)	-0.000366	(6.550108 , 33.546141)
101	-27.438003	2	(0 , 1)	(6.550108 , 33.546141)	-0.001682	(6.550108 , 33.544459)
102	(6.550108 , 33.544459)	1	(1 , 0)	(6.550108 , 33.544459)	-0.000366	(6.550108 , 33.544459)

102	(6.550108 , 33.544459)	1	(1 , 0)	(6.550108 , 33.544459)	-0.000366	(6.549743 , 33.544459)
102	-27.438040	2	(0 , 1)	(6.549743 , 33.544459)	-0.002122	(6.549743 , 33.542337)
103	(6.549743 , 33.542337)	1	(1 , 0)	(6.549743 , 33.542337)	-0.000366	(6.549377 , 33.542337)
103	-27.438076	2	(0 , 1)	(6.549377 , 33.542337)	-0.001682	(6.549377 , 33.540655)
104	(6.549377 , 33.540655)	1	(1 , 0)	(6.549011 , 33.540655)	-0.000366	(6.549011 , 33.540655)
104	-27.438113	2	(0 , 1)	(6.549011 , 33.540655)	-0.001682	(6.549011 , 33.538973)
105	(6.549011 , 33.538973)	1	(1 , 0)	(6.548646 , 33.538973)	-0.000366	(6.548646 , 33.538973)
105	-27.438149	2	(0 , 1)	(6.548646 , 33.538973)	-0.002122	(6.548646 , 33.536851)
106	(6.548646 , 33.536851)	1	(1 , 0)	(6.548646 , 33.536851)	-0.000366	(6.548280 , 33.536851)
106	-27.438184	2	(0 , 1)	(6.548280 , 33.536851)	-0.001682	(6.548280 , 33.535169)
107	(6.548280 , 33.535169)	1	(1 , 0)	(6.548280 , 33.535169)	-0.000366	(6.547914 , 33.535169)
107	-27.438220	2	(0 , 1)	(6.547914 , 33.535169)	-0.001682	(6.547914 , 33.533488)
108	(6.547914 , 33.533488)	1	(1 , 0)	(6.547914 , 33.533488)	-0.000366	(6.547549 , 33.533488)
108	-27.438255	2	(0 , 1)	(6.547549 , 33.533488)	-0.002122	(6.547549 , 33.531365)
109	(6.547549 , 33.531365)	1	(1 , 0)	(6.547549 , 33.531365)	-0.000366	(6.547183 , 33.531365)
109	-27.438290	2	(0 , 1)	(6.547183 , 33.531365)	-0.001682	(6.547183 , 33.529683)
110	(6.547183 , 33.529683)	1	(1 , 0)	(6.547183 , 33.529683)	-0.000366	(6.546817 , 33.529683)
110	-27.438325	2	(0 , 1)	(6.546817 , 33.529683)	-0.001682	(6.546817 , 33.528002)
111	(6.546817 , 33.528002)	1	(1 , 0)	(6.546817 , 33.528002)	-0.000366	(6.546452 , 33.528002)
111	-27.438359	2	(0 , 1)	(6.546452 , 33.528002)	-0.002122	(6.546452 , 33.525879)
112	(6.546452 , 33.525879)	1	(1 , 0)	(6.546452 , 33.525879)	-0.000366	(6.546086 , 33.525879)
112	-27.438393	2	(0 , 1)	(6.546086 , 33.525879)	-0.001682	(6.546086 , 33.524198)
113	(6.546086 , 33.524198)	1	(1 , 0)	(6.546086 , 33.524198)	-0.000366	(6.545720 , 33.524198)
113	-27.438427	2	(0 , 1)	(6.545720 , 33.524198)	-0.001682	(6.545720 , 33.522516)
114	(6.545720 , 33.522516)	1	(1 , 0)	(6.545720 , 33.522516)	-0.000366	(6.545355 , 33.522516)
114	-27.438460	2	(0 , 1)	(6.545355 , 33.522516)	-0.002122	(6.545355 , 33.520394)
115	(6.545355 , 33.520394)	1	(1 , 0)	(6.545355 , 33.520394)	-0.000366	(6.544989 , 33.520394)
115	-27.438494	2	(0 , 1)	(6.544989 , 33.520394)	-0.001682	(6.544989 , 33.518712)
116	(6.544989 , 33.518712)	1	(1 , 0)	(6.544989 , 33.518712)	-0.000366	(6.544623 , 33.518712)
116	-27.438527	2	(0 , 1)	(6.544623 , 33.518712)	-0.001682	(6.544623 , 33.517030)
117	(6.544623 , 33.517030)	1	(1 , 0)	(6.544623 , 33.517030)	-0.000366	(6.544258 , 33.517030)
117	-27.438559	2	(0 , 1)	(6.544258 , 33.517030)	-0.002122	(6.544258 , 33.514908)
118	(6.544258 , 33.514908)	1	(1 , 0)	(6.544258 , 33.514908)	-0.000366	(6.543892 , 33.514908)
118	-27.438592	2	(0 , 1)	(6.543892 , 33.514908)	-0.001682	(6.543892 , 33.513226)
119	(6.543892 , 33.513226)	1	(1 , 0)	(6.543892 , 33.513226)	-0.000366	(6.543526 , 33.513226)
119	-27.438624	2	(0 , 1)	(6.543526 , 33.513226)	-0.001682	(6.543526 , 33.511544)
120	(6.543526 , 33.511544)	1	(1 , 0)	(6.543526 , 33.511544)	-0.000366	(6.543161 , 33.511544)
120	-27.438656	2	(0 , 1)	(6.543161 , 33.511544)	-0.002122	(6.543161 , 33.509422)
121	(6.543161 , 33.509422)	1	(1 , 0)	(6.543161 , 33.509422)	-0.000366	(6.542795 , 33.509422)
121	-27.438688	2	(0 , 1)	(6.542795 , 33.509422)	-0.001682	(6.542795 , 33.507740)
122	(6.542795 , 33.507740)	1	(1 , 0)	(6.542795 , 33.507740)	-0.000366	(6.542429 , 33.507740)
122	-27.438719	2	(0 , 1)	(6.542429 , 33.507740)	-0.001682	(6.542429 , 33.506059)
123	(6.542429 , 33.506059)	1	(1 , 0)	(6.542429 , 33.506059)	-0.000366	(6.542064 , 33.506059)
123	-27.438750	2	(0 , 1)	(6.542064 , 33.506059)	-0.002122	(6.542064 , 33.503936)
124	(6.542064 , 33.503936)	1	(1 , 0)	(6.542064 , 33.503936)	-0.000366	(6.541698 , 33.503936)
124	-27.438781	2	(0 , 1)	(6.541698 , 33.503936)	-0.001682	(6.541698 , 33.502255)
125	(6.541698 , 33.502255)	1	(1 , 0)	(6.541698 , 33.502255)	-0.000366	(6.541332 , 33.502255)
125	-27.438812	2	(0 , 1)	(6.541332 , 33.502255)	-0.001682	(6.541332 , 33.500573)
126	(6.541332 , 33.500573)	1	(1 , 0)	(6.541332 , 33.500573)	-0.000366	(6.540967 , 33.500573)
126	-27.438842	2	(0 , 1)	(6.540967 , 33.500573)	-0.002122	(6.540967 , 33.498451)
127	(6.540967 , 33.498451)	1	(1 , 0)	(6.540967 , 33.498451)	-0.000366	(6.540601 , 33.498451)
127	-27.438872	2	(0 , 1)	(6.540601 , 33.498451)	-0.001682	(6.540601 , 33.496769)
128	(6.540601 , 33.496769)	1	(1 , 0)	(6.540601 , 33.496769)	-0.000366	(6.540235 , 33.496769)
128	-27.438902	2	(0 , 1)	(6.540235 , 33.496769)	-0.001682	(6.540235 , 33.495087)
129	(6.540235 , 33.495087)	1	(1 , 0)	(6.540235 , 33.495087)	-0.000366	(6.539870 , 33.495087)
129	-27.438932	2	(0 , 1)	(6.539870 , 33.495087)	-0.002122	(6.539870 , 33.492965)
130	(6.539870 , 33.492965)	1	(1 , 0)	(6.539870 , 33.492965)	-0.000366	(6.539504 , 33.492965)
130	-27.438961	2	(0 , 1)	(6.539504 , 33.492965)	-0.001682	(6.539504 , 33.491283)
131	(6.539504 , 33.491283)	1	(1 , 0)	(6.539504 , 33.491283)	-0.000366	(6.539138 , 33.491283)
131	-27.438990	2	(0 , 1)	(6.539138 , 33.491283)	-0.001682	(6.539138 , 33.489601)
132	(6.539138 , 33.489601)	1	(1 , 0)	(6.539138 , 33.489601)	-0.000366	(6.538773 , 33.489601)
132	-27.439019	2	(0 , 1)	(6.538773 , 33.489601)	-0.002122	(6.538773 , 33.487479)
133	(6.538773 , 33.487479)	1	(1 , 0)	(6.538773 , 33.487479)	-0.000366	(6.538407 , 33.487479)
133	-27.439047	2	(0 , 1)	(6.538407 , 33.487479)	-0.001682	(6.538407 , 33.485797)
134	(6.538407 , 33.485797)	1	(1 , 0)	(6.538407 , 33.485797)	-0.000366	(6.538041 , 33.485797)
134	-27.439076	2	(0 , 1)	(6.538041 , 33.485797)	-0.001682	(6.538041 , 33.484115)
135	(6.538041 , 33.484115)	1	(1 , 0)	(6.538041 , 33.484115)	-0.000366	(6.537676 , 33.484115)
135	-27.439103	2	(0 , 1)	(6.537676 , 33.484115)	-0.002122	(6.537676 , 33.481993)
136	(6.537676 , 33.481993)	1	(1 , 0)	(6.537676 , 33.481993)	-0.000366	(6.537310 , 33.481993)

136	-27.439131	2	(0 , 1)	(6.537310 , 33.480311)	-0.001682	(6.537310 , 33.480311)
137	(6.537310 , 33.480311)	1	(1 , 0)	(6.537310 , 33.480311)	-0.000366	(6.536944 , 33.480311)
137	-27.439159	2	(0 , 1)	(6.536944 , 33.478630)	-0.001682	(6.536944 , 33.478630)
138	(6.536944 , 33.478630)	1	(1 , 0)	(6.536944 , 33.478630)	-0.000366	(6.536579 , 33.478630)
138	-27.439186	2	(0 , 1)	(6.536579 , 33.478630)	-0.002122	(6.536579 , 33.476507)
139	(6.536579 , 33.476507)	1	(1 , 0)	(6.536579 , 33.476507)	-0.000366	(6.536213 , 33.476507)
139	-27.439213	2	(0 , 1)	(6.536213 , 33.476507)	-0.001682	(6.536213 , 33.474826)
140	(6.536213 , 33.474826)	1	(1 , 0)	(6.536213 , 33.474826)	-0.000366	(6.535847 , 33.474826)
140	-27.439239	2	(0 , 1)	(6.535847 , 33.474826)	-0.001682	(6.535847 , 33.473144)
141	(6.535847 , 33.473144)	1	(1 , 0)	(6.535847 , 33.473144)	-0.000366	(6.535482 , 33.473144)
141	-27.439266	2	(0 , 1)	(6.535482 , 33.473144)	-0.002122	(6.535482 , 33.471022)
142	(6.535482 , 33.471022)	1	(1 , 0)	(6.535482 , 33.471022)	-0.000366	(6.535116 , 33.471022)
142	-27.439292	2	(0 , 1)	(6.535116 , 33.471022)	-0.001682	(6.535116 , 33.469340)
143	(6.535116 , 33.469340)	1	(1 , 0)	(6.535116 , 33.469340)	-0.000366	(6.534750 , 33.469340)
143	-27.439318	2	(0 , 1)	(6.534750 , 33.469340)	-0.001682	(6.534750 , 33.467658)
144	(6.534750 , 33.467658)	1	(1 , 0)	(6.534750 , 33.467658)	-0.000366	(6.534385 , 33.467658)
144	-27.439343	2	(0 , 1)	(6.534385 , 33.467658)	-0.002122	(6.534385 , 33.465536)
145	(6.534385 , 33.465536)	1	(1 , 0)	(6.534385 , 33.465536)	-0.000366	(6.534019 , 33.465536)
145	-27.439368	2	(0 , 1)	(6.534019 , 33.465536)	-0.001682	(6.534019 , 33.463854)
146	(6.534019 , 33.463854)	1	(1 , 0)	(6.534019 , 33.463854)	-0.000366	(6.533653 , 33.463854)
146	-27.439393	2	(0 , 1)	(6.533653 , 33.463854)	-0.001682	(6.533653 , 33.462172)
147	(6.533653 , 33.462172)	1	(1 , 0)	(6.533653 , 33.462172)	-0.000366	(6.533288 , 33.462172)
147	-27.439418	2	(0 , 1)	(6.533288 , 33.462172)	-0.002122	(6.533288 , 33.460050)
148	(6.533288 , 33.460050)	1	(1 , 0)	(6.533288 , 33.460050)	-0.000366	(6.532922 , 33.460050)
148	-27.439443	2	(0 , 1)	(6.532922 , 33.460050)	-0.001682	(6.532922 , 33.458368)
149	(6.532922 , 33.458368)	1	(1 , 0)	(6.532922 , 33.458368)	-0.000366	(6.532556 , 33.458368)
149	-27.439467	2	(0 , 1)	(6.532556 , 33.458368)	-0.001682	(6.532556 , 33.456687)
150	(6.532556 , 33.456687)	1	(1 , 0)	(6.532556 , 33.456687)	-0.000366	(6.532191 , 33.456687)
150	-27.439491	2	(0 , 1)	(6.532191 , 33.456687)	-0.002122	(6.532191 , 33.454564)
151	(6.532191 , 33.454564)	1	(1 , 0)	(6.532191 , 33.454564)	-0.000366	(6.531825 , 33.454564)
151	-27.439515	2	(0 , 1)	(6.531825 , 33.454564)	-0.001682	(6.531825 , 33.452883)
152	(6.531825 , 33.452883)	1	(1 , 0)	(6.531825 , 33.452883)	-0.000366	(6.531459 , 33.452883)
152	-27.439538	2	(0 , 1)	(6.531459 , 33.452883)	-0.001682	(6.531459 , 33.451201)
153	(6.531459 , 33.451201)	1	(1 , 0)	(6.531459 , 33.451201)	-0.000366	(6.531094 , 33.451201)
153	-27.439561	2	(0 , 1)	(6.531094 , 33.451201)	-0.002122	(6.531094 , 33.449078)
154	(6.531094 , 33.449078)	1	(1 , 0)	(6.531094 , 33.449078)	-0.000366	(6.530728 , 33.449078)
154	-27.439584	2	(0 , 1)	(6.530728 , 33.449078)	-0.001682	(6.530728 , 33.447397)
155	(6.530728 , 33.447397)	1	(1 , 0)	(6.530728 , 33.447397)	-0.000366	(6.530362 , 33.447397)
155	-27.439607	2	(0 , 1)	(6.530362 , 33.447397)	-0.001682	(6.530362 , 33.445715)
156	(6.530362 , 33.445715)	1	(1 , 0)	(6.530362 , 33.445715)	-0.000366	(6.529997 , 33.445715)
156	-27.439629	2	(0 , 1)	(6.529997 , 33.445715)	-0.002122	(6.529997 , 33.443593)
157	(6.529997 , 33.443593)	1	(1 , 0)	(6.529997 , 33.443593)	-0.000366	(6.529631 , 33.443593)
157	-27.439651	2	(0 , 1)	(6.529631 , 33.443593)	-0.001682	(6.529631 , 33.441911)
158	(6.529631 , 33.441911)	1	(1 , 0)	(6.529631 , 33.441911)	-0.000366	(6.529266 , 33.441911)
158	-27.439673	2	(0 , 1)	(6.529266 , 33.441911)	-0.001682	(6.529266 , 33.440229)
159	(6.529266 , 33.440229)	1	(1 , 0)	(6.529266 , 33.440229)	-0.000366	(6.528900 , 33.440229)
159	-27.439694	2	(0 , 1)	(6.528900 , 33.440229)	-0.002122	(6.528900 , 33.438107)
160	(6.528900 , 33.438107)	1	(1 , 0)	(6.528900 , 33.438107)	-0.000366	(6.528534 , 33.438107)
160	-27.439716	2	(0 , 1)	(6.528534 , 33.438107)	-0.001682	(6.528534 , 33.436425)
161	(6.528534 , 33.436425)	1	(1 , 0)	(6.528534 , 33.436425)	-0.000366	(6.528169 , 33.436425)
161	-27.439737	2	(0 , 1)	(6.528169 , 33.436425)	-0.001682	(6.528169 , 33.434743)
162	(6.528169 , 33.434743)	1	(1 , 0)	(6.528169 , 33.434743)	-0.000366	(6.527803 , 33.434743)
162	-27.439757	2	(0 , 1)	(6.527803 , 33.434743)	-0.002122	(6.527803 , 33.432621)
163	(6.527803 , 33.432621)	1	(1 , 0)	(6.527803 , 33.432621)	-0.000366	(6.527437 , 33.432621)
163	-27.439778	2	(0 , 1)	(6.527437 , 33.432621)	-0.001682	(6.527437 , 33.430939)
164	(6.527437 , 33.430939)	1	(1 , 0)	(6.527437 , 33.430939)	-0.000366	(6.527072 , 33.430939)
164	-27.439798	2	(0 , 1)	(6.527072 , 33.430939)	-0.001682	(6.527072 , 33.429258)
165	(6.527072 , 33.429258)	1	(1 , 0)	(6.527072 , 33.429258)	-0.000366	(6.526706 , 33.429258)
165	-27.439818	2	(0 , 1)	(6.526706 , 33.429258)	-0.002122	(6.526706 , 33.427135)
166	(6.526706 , 33.427135)	1	(1 , 0)	(6.526706 , 33.427135)	-0.000366	(6.526340 , 33.427135)
166	-27.439838	2	(0 , 1)	(6.526340 , 33.427135)	-0.001682	(6.526340 , 33.425454)
167	(6.526340 , 33.425454)	1	(1 , 0)	(6.526340 , 33.425454)	-0.000366	(6.525975 , 33.425454)
167	-27.439857	2	(0 , 1)	(6.525975 , 33.425454)	-0.001682	(6.525975 , 33.423772)
168	(6.525975 , 33.423772)	1	(1 , 0)	(6.525975 , 33.423772)	-0.000366	(6.525609 , 33.423772)
168	-27.439876	2	(0 , 1)	(6.525609 , 33.423772)	-0.002122	(6.525609 , 33.421650)
169	(6.525609 , 33.421650)	1	(1 , 0)	(6.525609 , 33.421650)	-0.000366	(6.525243 , 33.421650)
169	-27.439895	2	(0 , 1)	(6.525243 , 33.421650)	-0.001682	(6.525243 , 33.419968)
170	(6.525243 , 33.419968)	1	(1 , 0)	(6.525243 , 33.419968)	-0.000366	(6.524878 , 33.419968)
170	-27.439914	2	(0 , 1)	(6.524878 , 33.419968)	-0.001682	(6.524878 , 33.418286)

171	(6.524878 , 33.418286)	1	(1 , 0)	(6.524878 , 33.418286)	-0.000366	(6.524512 , 33.418286)
171	-27.439932	2	(0 , 1)	(6.524512 , 33.418286)	-0.002122	(6.524512 , 33.416164)
172	(6.524512 , 33.416164)	1	(1 , 0)	(6.524512 , 33.416164)	-0.000366	(6.524146 , 33.416164)
172	-27.439950	2	(0 , 1)	(6.524146 , 33.416164)	-0.001682	(6.524146 , 33.414482)
173	(6.524146 , 33.414482)	1	(1 , 0)	(6.524146 , 33.414482)	-0.000366	(6.523781 , 33.414482)
173	-27.439968	2	(0 , 1)	(6.523781 , 33.414482)	-0.001682	(6.523781 , 33.412800)
174	(6.523781 , 33.412800)	1	(1 , 0)	(6.523781 , 33.412800)	-0.000366	(6.523415 , 33.412800)
174	-27.439985	2	(0 , 1)	(6.523415 , 33.412800)	-0.002122	(6.523415 , 33.410678)
175	(6.523415 , 33.410678)	1	(1 , 0)	(6.523415 , 33.410678)	-0.000366	(6.523049 , 33.410678)
175	-27.440002	2	(0 , 1)	(6.523049 , 33.410678)	-0.001682	(6.523049 , 33.408996)
176	(6.523049 , 33.408996)	1	(1 , 0)	(6.523049 , 33.408996)	-0.000366	(6.522684 , 33.408996)
176	-27.440020	2	(0 , 1)	(6.522684 , 33.408996)	-0.001682	(6.522684 , 33.407314)
177	(6.522684 , 33.407314)	1	(1 , 0)	(6.522684 , 33.407314)	-0.000366	(6.522318 , 33.407314)
177	-27.440036	2	(0 , 1)	(6.522318 , 33.407314)	-0.002122	(6.522318 , 33.405192)
178	(6.522318 , 33.405192)	1	(1 , 0)	(6.522318 , 33.405192)	-0.000366	(6.521952 , 33.405192)
178	-27.440053	2	(0 , 1)	(6.521952 , 33.405192)	-0.001682	(6.521952 , 33.403510)
179	(6.521952 , 33.403510)	1	(1 , 0)	(6.521952 , 33.403510)	-0.000366	(6.521587 , 33.403510)
179	-27.440069	2	(0 , 1)	(6.521587 , 33.403510)	-0.001682	(6.521587 , 33.401829)
180	(6.521587 , 33.401829)	1	(1 , 0)	(6.521587 , 33.401829)	-0.000366	(6.521221 , 33.401829)
180	-27.440085	2	(0 , 1)	(6.521221 , 33.401829)	-0.002122	(6.521221 , 33.399706)
181	(6.521221 , 33.399706)	1	(1 , 0)	(6.521221 , 33.399706)	-0.000366	(6.520855 , 33.399706)
181	-27.440100	2	(0 , 1)	(6.520855 , 33.399706)	-0.001682	(6.520855 , 33.398025)
182	(6.520855 , 33.398025)	1	(1 , 0)	(6.520855 , 33.398025)	-0.000366	(6.520490 , 33.398025)
182	-27.440116	2	(0 , 1)	(6.520490 , 33.398025)	-0.001682	(6.520490 , 33.396343)
183	(6.520490 , 33.396343)	1	(1 , 0)	(6.520490 , 33.396343)	-0.000366	(6.520124 , 33.396343)
183	-27.440131	2	(0 , 1)	(6.520124 , 33.396343)	-0.002122	(6.520124 , 33.394221)
184	(6.520124 , 33.394221)	1	(1 , 0)	(6.520124 , 33.394221)	-0.000366	(6.519758 , 33.394221)
184	-27.440146	2	(0 , 1)	(6.519758 , 33.394221)	-0.001682	(6.519758 , 33.392539)
185	(6.519758 , 33.392539)	1	(1 , 0)	(6.519758 , 33.392539)	-0.000366	(6.519393 , 33.392539)
185	-27.440160	2	(0 , 1)	(6.519393 , 33.392539)	-0.001682	(6.519393 , 33.390857)
186	(6.519393 , 33.390857)	1	(1 , 0)	(6.519393 , 33.390857)	-0.000366	(6.519027 , 33.390857)
186	-27.440175	2	(0 , 1)	(6.519027 , 33.390857)	-0.002122	(6.519027 , 33.388735)
187	(6.519027 , 33.388735)	1	(1 , 0)	(6.519027 , 33.388735)	-0.000366	(6.518661 , 33.388735)
187	-27.440189	2	(0 , 1)	(6.518661 , 33.388735)	-0.001682	(6.518661 , 33.387053)
188	(6.518661 , 33.387053)	1	(1 , 0)	(6.518661 , 33.387053)	-0.000366	(6.518296 , 33.387053)
188	-27.440203	2	(0 , 1)	(6.518296 , 33.387053)	-0.001682	(6.518296 , 33.385371)
189	(6.518296 , 33.385371)	1	(1 , 0)	(6.518296 , 33.385371)	-0.000366	(6.517930 , 33.385371)
189	-27.440216	2	(0 , 1)	(6.517930 , 33.385371)	-0.002122	(6.517930 , 33.383249)
190	(6.517930 , 33.383249)	1	(1 , 0)	(6.517930 , 33.383249)	-0.000366	(6.517564 , 33.383249)
190	-27.440229	2	(0 , 1)	(6.517564 , 33.383249)	-0.001682	(6.517564 , 33.381567)
191	(6.517564 , 33.381567)	1	(1 , 0)	(6.517564 , 33.381567)	-0.000366	(6.517199 , 33.381567)
191	-27.440242	2	(0 , 1)	(6.517199 , 33.381567)	-0.001682	(6.517199 , 33.379886)
192	(6.517199 , 33.379886)	1	(1 , 0)	(6.517199 , 33.379886)	0.000052	(6.517250 , 33.379886)
192	-27.440255	2	(0 , 1)	(6.517250 , 33.379886)	0.000210	(6.517250 , 33.380096)

## 2. Hooke And Jeeves

Hooke And Jeeves											
k	x f(x)	j	y(j)	d(j)	landa	y(j+1)	d	landa_had	y(j) + landa_had*d		
1	(6.000000 , 34.000000)	1	(6.000000 , 34.000000)	(1 , 0)	0.639786	(6.639786 , 34.000000)					
1	222.000000	2	(6.639786 , 34.000000)	(0 , 1)	-0.007372	(6.639786 , 33.992628)	(0.639786 , -0.007372)	-0.002241	(6.638352 , 33.992645)		
2	(6.639786 , 33.992628)	1	(6.638352 , 33.992645)	(1 , 0)	0.000028	(6.638379 , 33.992645)					
2	-27.421011	2	(6.638379 , 33.992645)	(0 , 1)	-0.007022	(6.638379 , 33.985623)	(-0.001406 , -0.007006)	1.999636	(6.635567 , 33.971614)		
3	(6.638379 , 33.985623)	1	(6.635567 , 33.971614)	(1 , 0)	-0.001397	(6.634170 , 33.971614)					
3	-27.421482	2	(6.634170 , 33.971614)	(0 , 1)	-0.007071	(6.634170 , 33.964543)	(-0.004210 , -0.021080)	1.999636	(6.625752 , 33.922390)		
4	(6.634170 , 33.964543)	1	(6.625752 , 33.922390)	(1 , 0)	-0.001309	(6.624443 , 33.922390)					
4	-27.422549	2	(6.624443 , 33.922390)	(0 , 1)	-0.006486	(6.624443 , 33.915984)	(-0.009726 , -0.048639)	1.999636	(6.604994 , 33.818644)		
5	(6.624443 , 33.915984)	1	(6.604994 , 33.818644)	(1 , 0)	-0.001897	(6.603897 , 33.818644)					
5	-27.425065	2	(6.603897 , 33.818644)	(0 , 1)	-0.005443	(6.603897 , 33.813201)	(-0.020546 , -0.102703)	1.999636	(6.562813 , 33.607832)		
6	(6.603897 , 33.813201)	1	(6.562813 , 33.607832)	(1 , 0)	-0.003442	(6.562813 , 33.604541)					
6	-27.429366	2	(6.562813 , 33.604541)	(0 , 1)	-0.003241	(6.562813 , 33.604541)	(-0.041727 , -0.208660)	1.489737	(6.500009 , 33.293692)		
7	(6.562113 , 33.604541)	1	(6.500009 , 33.293692)	(1 , 0)	0.000620	(6.500037 , 33.293692)					
7	-27.436686	2	(6.500037 , 33.293692)	(0 , 1)	0.000173	(6.500037 , 33.293865)	(-0.062134 , -0.310676)	0.000791	(6.499988 , 33.293619)		
8	(6.500037 , 33.293865)	1	(6.499988 , 33.293619)	(1 , 0)	0.000028	(6.500015 , 33.293619)		-	-		

### 3. Steepest And Descent

Steepest And Descent										
k	x f(x)	j	y(j)	f(y(j))	d(j)	landa(j)	y(j+1)	f(y(j+1))		
1	(6.000000 , 34.000000)	1	(6.000000 , 34.000000)	222.000000	(1.000000 , 0.000000)	0.639786	(6.639786 , 34.000000)	-27.420804		
1	222.000000	2	(6.639786 , 34.000000)	-27.420804	(0.000000 , 1.000000)	-0.007372	(6.632414 , 34.000000)	-27.415345		
2	(6.632414 , 34.000000)	1	(6.632414 , 34.000000)	-27.415345	(0.999934 , -0.011521)	0.007372	(6.639785 , 33.999915)	-27.420809		
2	-27.415345	2	(6.639785 , 33.999915)	-27.420809	(-0.011521 , -0.999934)	0.008199	(6.647984 , 33.999821)	-27.414455		
3	(6.647984 , 33.999821)	1	(6.647984 , 33.999821)	-27.414455	(0.659977 , -0.751286)	-0.009817	(6.641505 , 34.007196)	-27.420392		
3	-27.414455	2	(6.641505 , 34.007196)	-27.420392	(-0.751286 , -0.659977)	0.000953	(6.642134 , 34.006480)	-27.420332		
4	(6.642134 , 34.006480)	1	(6.642134 , 34.006480)	-27.420332	(-0.729512 , 0.683968)	0.000953	(6.641439 , 34.007132)	-27.420398		
4	-27.420332	2	(6.641439 , 34.007132)	-27.420398	(-0.683968 , -0.729512)	0.001143	(6.640605 , 34.007914)	-27.420303		
5	(6.640605 , 34.007914)	1	(6.640605 , 34.007914)	-27.420303	(-0.992529 , -0.122011)	-0.000768	(6.641355 , 34.008006)	-27.420354		
5	-27.420303	2	(6.641355 , 34.008006)	-27.420354	(0.122011 , -0.992529)	0.002983	(6.638398 , 34.007642)	-27.419542		
6	(6.638398 , 34.007642)	1	(6.638398 , 34.007642)	-27.419542	(0.362296 , -0.917164)	0.006182	(6.649644 , 34.001983)	-27.420677		
6	-27.419542	2	(6.649644 , 34.001983)	-27.420677	(-0.917164 , -0.362296)	0.000682	(6.640892 , 34.001247)	-27.420664		
7	(6.640892 , 34.001247)	1	(6.640892 , 34.001247)	-27.420664	(0.258905 , -0.965903)	-0.000529	(6.640755 , 34.001759)	-27.420669		
7	-27.420664	2	(6.640755 , 34.001759)	-27.420669	(-0.965903 , -0.258905)	0.008764	(6.640953 , 34.001821)	-27.420658		
8	(6.640953 , 34.001821)	1	(6.640953 , 34.001821)	-27.420658	(-0.941307 , 0.337552)	0.000830	(6.640171 , 34.001302)	-27.420730		
8	-27.420658	2	(6.640171 , 34.001302)	-27.420730	(-0.337552 , -0.941307)	0.012278	(6.628614 , 34.005446)	-27.405132		
9	(6.628614 , 34.005446)	1	(6.628614 , 34.005446)	-27.405132	(-0.400300 , -0.916384)	-0.050173	(6.648659 , 34.051424)	-27.417665		
9	-27.405132	2	(6.648659 , 34.051424)	-27.417665	(0.916384 , -0.400300)	0.001400	(6.648138 , 34.050141)	-27.417677		
10	(6.648138 , 34.050141)	1	(6.648138 , 34.050141)	-27.417656	(0.425696 , 0.904866)	0.001885	(6.648940 , 34.051847)	-27.417664		
10	-27.417656	2	(6.648940 , 34.051847)	-27.417677	(0.904866 , -0.425696)	0.001242	(6.649469 , 34.052971)	-27.417667		
11	(6.649469 , 34.052971)	1	(6.649469 , 34.052971)	-27.417667	(0.853359 , 0.521323)	0.000775	(6.650131 , 34.053375)	-27.417702		
11	-27.417667	2	(6.650131 , 34.053375)	-27.417702	(0.521323 , -0.853359)	0.000874	(6.650877 , 34.053831)	-27.417662		
12	(6.650877 , 34.053831)	1	(6.650877 , 34.053831)	-27.417662	(0.956212 , -0.292676)	-0.000355	(6.650537 , 34.053935)	-27.417673		
12	-27.417662	2	(6.650537 , 34.053935)	-27.417673	(-0.292676 , 0.956212)	0.026990	(6.676268 , 34.046059)	-27.353137		
13	(6.676268 , 34.046059)	1	(6.676268 , 34.046059)	-27.353137	(-0.305263 , -0.952268)	0.248846	(6.600394 , 33.809911)	-27.429754		
13	-27.353137	2	(6.600394 , 33.809911)	-27.429754	(0.952268 , -0.305263)	0.001723	(6.599778 , 33.807450)	-27.429750		
14	(6.599778 , 33.807450)	1	(6.599778 , 33.807450)	-27.429750	(-0.298662 , -0.954359)	-0.000852	(6.600933 , 33.808263)	-27.429751		
14	-27.429750	2	(6.600933 , 33.808263)	-27.429751	(0.954359 , -0.298662)	0.001824	(6.599488 , 33.806523)	-27.429747		
15	(6.599488 , 33.806523)	1	(6.599488 , 33.806523)	-27.429747	(0.991080 , 0.133270)	0.002069	(6.601532 , 33.806798)	-27.430130		
15	-27.429747	2	(6.601532 , 33.806798)	-27.430130	(0.133270 , -0.991080)	0.001969	(6.603490 , 33.807061)	-27.429778		
16	(6.603490 , 33.807061)	1	(6.603490 , 33.807061)	-27.429778	(0.809014 , -0.586549)	-0.001848	(6.601993 , 33.808144)	-27.430072		
16	-27.429778	2	(6.601993 , 33.808144)	-27.430072	(-0.586549 , -0.809014)	0.001362	(6.603096 , 33.807346)	-27.429909		
17	(6.603096 , 33.807346)	1	(6.603096 , 33.807346)	-27.429909	(-0.999966 , -0.008278)	0.001437	(6.601659 , 33.807334)	-27.430108		
17	-27.429909	2	(6.601659 , 33.807334)	-27.430108	(0.008278 , -0.999966)	0.004903	(6.595756 , 33.807293)	-27.427745		
18	(6.595756 , 33.807293)	1	(6.595756 , 33.807293)	-27.427745	(-0.273253 , -0.961942)	-0.028559	(6.604561 , 33.807465)	-27.428338		
18	-27.427745	2	(6.604561 , 33.807465)	-27.428338	(0.961942 , -0.273253)	0.002490	(6.603880 , 33.832370)	-27.428333		
19	(6.603880 , 33.832370)	1	(6.603880 , 33.832370)	-27.428333	(0.355770 , 0.934574)	0.008884	(6.607040 , 33.840673)	-27.428564		
19	-27.428333	2	(6.607040 , 33.840673)	-27.428564	(0.934574 , -0.355770)	0.001280	(6.607496 , 33.841870)	-27.428560		
20	(6.607496 , 33.841870)	1	(6.607496 , 33.841870)	-27.428560	(0.485416 , 0.874283)	0.001177	(6.608067 , 33.842899)	-27.428573		
20	-27.428560	2	(6.608067 , 33.842899)	-27.428573	(0.874283 , -0.485416)	0.000775	(6.608443 , 33.843576)	-27.428568		
21	(6.608443 , 33.843576)	1	(6.608443 , 33.843576)	-27.428568	(0.886285 , 0.463140)	0.000325	(6.608731 , 33.843727)	-27.428574		
21	-27.428568	2	(6.608731 , 33.843727)	-27.428574	(0.463140 , -0.886285)	0.000694	(6.609346 , 33.844048)	-27.428545		
22	(6.609346 , 33.844048)	1	(6.609346 , 33.844048)	-27.428545	(0.795194 , -0.663355)	-0.000327	(6.609887 , 33.844246)	-27.428552		
22	-27.428545	2	(6.609887 , 33.844246)	-27.428552	(-0.663355 , 0.795194)	0.001143	(6.609994 , 33.843553)	-27.428452		
23	(6.609994 , 33.843553)	1	(6.609994 , 33.843553)	-27.428452	(0.801468 , -0.598938)	0.001998	(6.608394 , 33.842358)	-27.428632		
23	-27.428452	2	(6.608394 , 33.842358)	-27.428632	(-0.598938 , -0.801468)	0.000554	(6.607950 , 33.842027)	-27.428618		
24	(6.607950 , 33.842027)	1	(6.607950 , 33.842027)	-27.428618	(0.612399 , -0.790549)	-0.000499	(6.608201 , 33.842350)	-27.428621		
24	-27.428618	2	(6.608201 , 33.842350)	-27.428621	(0.790549 , -0.612399)	0.000583	(6.607843 , 33.841889)	-27.428614		
25	(6.607843 , 33.841889)	1	(6.607843 , 33.841889)	-27.428614	(0.998877 , -0.047382)	0.000647	(6.608490 , 33.841859)	-27.428657		
25	-27.428614	2	(6.608490 , 33.841859)	-27.428657	(-0.047382 , -0.998877)	0.009870	(6.618349 , 33.841391)	-27.419476		
26	(6.618349 , 33.841391)	1	(6.618349 , 33.841391)	-27.419476	(0.018167 , -0.998836)	-0.048888	(6.617689 , 33.882272)	-27.426718		
26	-27.419476	2	(6.617689 , 33.882272)	-27.426718	(-0.998836 , -0.018167)	0.001184	(6.617629 , 33.881169)	-27.426712		
27	(6.617629 , 33.881169)	1	(6.617629 , 33.881169)	-27.426712	(-0.645879 , 0.998983)	0.001487	(6.617562 , 33.882654)	-27.426725		
27	-27.426712	2	(6.617562 , 33.882654)	-27.426725	(-0.998893 , -0.645879)	0.001026	(6.617516 , 33.883679)	-27.426719		
28	(6.617516 , 33.883679)	1	(6.617516 , 33.883679)	-27.426719	(-0.604282 , 0.796770)	0.000623	(6.617139 , 33.884175)	-27.426743		
28	-27.426719	2	(6.617139 , 33.884175)	-27.426743	(-0.796770 , -0.604282)	0.000703	(6.616715 , 33.884735)	-27.426717		
29	(6.616715 , 33.884735)	1	(6.616715 , 33.884735)	-27.426717	(-0.997097 , 0.076141)	-0.000251	(6.616965 , 33.884468)	-27.426724		
29	-27.426717	2	(6.616965 , 33.884468)	-27.426724	(0.076141 , -0.997097)	0.016056	(6.609056 , 33.885938)	-27.399265		
30	(6.609056 , 33.885938)	1	(6.609056 , 33.885938)	-27.399265	(-0.060528 , -0.998166)	0.128851	(6.593157 , 33.757323)	-27.431855		
30	-27.399265	2	(6.593157 , 33.757323)	-27.431855	(-0.998166 , 0.060528)	0.001377	(6.593073 , 33.755949)	-27.431852		
31	(6.593073 , 33.755949)	1	(6.593073 , 33.755949)	-27.431855	(-0.071190 , -0.997463)	-0.000602	(6.593116 , 33.756550)	-27.431852		
31	-27.431852	2	(6.593116 , 33.756550)	-27.431852	(-0.997463 , 0.071190)	0.001487	(6.593010 , 33.755066)	-27.431849		
32	(6.593010 , 33.755066)	1	(6.593010 , 33.755066)	-27.431849	(-0.897835 , 0.440331)	0.001657	(6.591523 , 33.755796)	-27.432098		

32	(-0.4158819 , -33.756886)	2	(6.5918523 , 33.755796)	-27.432098	(-0.440331 , -0.897835)	0.002708	(6.589891 , 33.756988)	-27.431394
33	(6.589091 , 33.756988)	1	(6.589891 , 33.756988)	-27.431394	(-0.844241 , -0.535964)	-0.003358	(6.591926 , 33.758788)	-27.431987
34	(-27.431394 , 33.758517)	2	(6.591926 , 33.758788)	-27.431987	(0.535964 , -0.844241)	0.000506	(6.591949 , 33.758517)	-27.431975
34	(-27.431394 , 33.758517)	1	(6.591949 , 33.758517)	-27.431975	(0.914681 , 0.404177)	0.000506	(6.591962 , 33.758721)	-27.431991
35	(6.592539 , 33.758976)	2	(6.591962 , 33.758721)	-27.431991	(0.494177 , -0.914681)	0.000631	(6.592539 , 33.758976)	-27.431962
35	(-27.431962 , 33.758976)	2	(6.592214 , 33.759145)	-27.431975	(-0.460892 , -0.887441)	0.002388	(6.594333 , 33.758845)	-27.431451
36	(6.594333 , 33.758045)	1	(6.594333 , 33.758845)	-27.431451	(-0.590251 , -0.887220)	0.006467	(6.590516 , 33.752416)	-27.432195
36	(-27.431451 , 33.758045)	2	(6.590516 , 33.752416)	-27.431975	(-0.897220 , -0.590251)	0.000596	(6.590217 , 33.752705)	-27.432190
37	(6.598217 , 33.752416)	1	(6.590217 , 33.752416)	-27.431975	(-0.525490 , -0.850800)	-0.000340	(6.598391 , 33.752705)	-27.432192
37	(-27.432196 , 33.752705)	2	(6.590396 , 33.752705)	-27.432192	(0.850800 , -0.525490)	0.000594	(6.598084 , 33.752200)	-27.432187
38	(6.590084 , 33.752200)	1	(6.590084 , 33.752200)	-27.432187	(0.999455 , -0.033020)	0.000647	(6.590731 , 33.752178)	-27.432230
38	(-27.432187 , 33.752178)	2	(6.590731 , 33.752178)	-27.432230	(-0.033020 , -0.999455)	0.000693	(6.597661 , 33.751949)	-27.427678
39	(6.597661 , 33.751949)	1	(6.597661 , 33.751949)	-27.427678	(0.059983 , -0.998199)	-0.024078	(6.596222 , 33.775984)	-27.431287
39	(-27.427678 , 33.775984)	2	(6.596222 , 33.775984)	-27.431287	(-0.998199 , -0.059983)	0.000772	(6.596268 , 33.775214)	-27.431283
40	(6.596268 , 33.775214)	1	(6.596268 , 33.775214)	-27.431283	(-0.091925 , 0.995766)	0.000977	(6.596178 , 33.776186)	-27.431291
40	(-27.431283 , 33.776186)	2	(6.596178 , 33.776186)	-27.431291	(-0.995766 , -0.091925)	0.000703	(6.596114 , 33.776886)	-27.431287
41	(6.596114 , 33.776886)	1	(6.596114 , 33.776886)	-27.431287	(-0.456615 , 0.754661)	0.000359	(6.595878 , 33.777157)	-27.431295
41	(-27.431287 , 33.777157)	2	(6.595878 , 33.777157)	-27.431295	(-0.754661 , -0.456615)	0.000623	(6.595469 , 33.776727)	-27.431272
42	(6.595469 , 33.777627)	1	(6.595469 , 33.777627)	-27.431272	(-0.981580 , -0.191584)	-0.003035	(6.595768 , 33.777685)	-27.431279
42	(-27.431272 , 33.777685)	2	(6.595768 , 33.777685)	-27.431279	(0.191054 , -0.981580)	0.001350	(6.594443 , 33.777427)	-27.431126
43	(6.594443 , 33.777427)	1	(6.594443 , 33.777427)	-27.431279	(0.492428 , -0.915452)	0.002735	(6.595544 , 33.774924)	-27.431376
43	(-27.431279 , 33.774924)	2	(6.595544 , 33.774924)	-27.431376	(-0.915452 , -0.492428)	0.000475	(6.595735 , 33.774489)	-27.431369
44	(6.595735 , 33.774489)	1	(6.595735 , 33.774489)	-27.431369	(0.239826 , -0.970816)	-0.000265	(6.595671 , 33.774747)	-27.431370
44	(-27.431369 , 33.774747)	2	(6.595671 , 33.774747)	-27.431378	(-0.970816 , -0.239826)	0.000556	(6.595885 , 33.774207)	-27.431364
45	(6.595885 , 33.774207)	1	(6.595885 , 33.774207)	-27.431364	(-0.379421 , 0.281826)	0.000659	(6.595159 , 33.774340)	-27.431406
45	(-27.431364 , 33.774340)	2	(6.595159 , 33.774340)	-27.431406	(-0.201826 , -0.979421)	0.422484	(6.181370 , 33.859608)	43.963253
46	(6.181370 , 33.859608)	1	(6.181370 , 33.859608)	-27.431406	(-0.283354 , -0.979105)	-8.000996	(8.011545 , 42.338209)	17.482678
46	(-27.431406 , 33.859608)	2	(8.011545 , 42.338209)	-27.431406	(-0.283354 , -0.979105)	0.340429	(7.942318 , 42.338209)	18.175127
47	(7.942318 , 42.338209)	1	(7.942318 , 42.338209)	-27.431406	(0.240217 , 0.970719)	0.999967	(8.422744 , 44.279615)	-4.878321
47	(-27.431406 , 42.338209)	2	(8.422744 , 44.279615)	-27.431406	(-0.970719 , -0.240217)	0.250213	(8.482849 , 44.522502)	-6.779038
48	(8.482849 , 44.522502)	1	(8.482849 , 44.522502)	-27.431406	(0.358864 , 0.933900)	0.283678	(8.943515 , 45.720674)	-21.272982
48	(-6.779038 , 45.720674)	2	(8.943515 , 45.720674)	-27.431406	(-0.933390 , -0.358864)	0.020559	(8.950893 , 45.739863)	-21.271062
49	(8.950893 , 45.739863)	1	(8.950893 , 45.739863)	-27.431406	(0.373765 , 0.927523)	-0.010490	(8.946973 , 45.730133)	-21.271650
49	(-21.271062 , 45.730133)	2	(8.946973 , 45.730133)	-27.431406	(0.927523 , -0.373765)	0.019019	(8.954081 , 45.747774)	-21.269722
50	(8.954081 , 45.747774)	1	(8.954081 , 45.747774)	-27.431406	(0.631668 , -0.775239)	0.022939	(8.968571 , 45.729991)	-21.311044
50	(-21.269722 , 45.729991)	2	(8.968571 , 45.729991)	-27.431406	(0.775239 , 0.631668)	-0.011964	(8.961014 , 45.739266)	-21.300158
51	(8.961014 , 45.739266)	1	(8.961014 , 45.739266)	-27.431406	(0.201566 , -0.979475)	0.039880	(8.969837 , 45.700275)	-21.329412
51	(-21.300158 , 45.700275)	2	(8.969837 , 45.700275)	-27.431406	(-0.979475 , -0.201566)	0.011922	(8.971441 , 45.688598)	-21.326990
52	(8.971441 , 45.688598)	1	(8.971441 , 45.688598)	-27.431406	(-0.087926 , -0.996127)	0.282137	(8.946633 , 45.407575)	-21.405917
52	(-21.326990 , 45.407575)	2	(8.946633 , 45.407575)	-27.431406	(-0.996127 , 0.087926)	0.045075	(8.942670 , 45.362654)	-21.404726
53	(8.942670 , 45.362654)	1	(8.942670 , 45.362654)	-27.431406	(-0.243975 , -0.969781)	1.940411	(8.462570 , 43.498079)	-22.994981
53	(-21.404226 , 43.498079)	2	(8.462570 , 43.498079)	-27.431406	(-0.243975 , -0.969781)	-0.049088	(8.481234 , 43.528484)	-22.982782
54	(8.481234 , 43.528484)	1	(8.481234 , 43.528484)	-27.431406	(-0.228782 , -0.219372)	1.221582	(8.213254 , 42.336658)	-23.250889
54	(-22.982782 , 42.336658)	2	(8.213254 , 42.336658)	-27.431406	(-0.219372 , -0.077470)	8.196259	(8.196259 , 42.261076)	-23.249751
55	(8.196259 , 42.261076)	1	(8.196259 , 42.261076)	-27.431406	(-0.157184 , -0.987569)	1.999967	(7.881897 , 44.279599)	-25.583160
55	(-23.249751 , 44.279599)	2	(7.881897 , 44.279599)	-27.431406	(-0.987569 , -0.157184)	0.003328	(7.881374 , 40.282682)	-25.585669
56	(7.881374 , 40.282682)	1	(7.881374 , 40.282682)	-27.431406	(-0.155540 , -0.987889)	1.951174	(7.577889 , 38.355255)	-25.972698
56	(-25.58069 , 38.355255)	2	(7.577889 , 38.355255)	-27.431406	(-0.155540 , -0.987889)	-0.073857	(7.589376 , 38.428213)	-25.972245
57	(7.589376 , 38.428213)	1	(7.589376 , 38.428213)	-27.431406	(-0.192745 , -0.981239)	1.999967	(7.203797 , 38.428213)	-25.972245
57	(-25.972245 , 38.428213)	2	(7.203797 , 38.428213)	-27.431406	(-0.192745 , -0.981239)	-0.073857	(7.589376 , 38.428213)	-25.972245
58	(7.189511 , 36.393063)	1	(7.189511 , 36.393063)	-27.431406	(-0.228988 , -0.973429)	1.999967	(6.731542 , 34.446237)	-27.386838
58	(-26.626194 , 34.446237)	2	(6.731542 , 34.446237)	-27.431406	(-0.973429 , -0.228988)	0.003269	(6.730793 , 34.443055)	-27.387205
59	(6.730793 , 34.443055)	1	(6.730793 , 34.443055)	-27.431406	(-0.230879 , -0.973054)	0.308369	(6.659690 , 34.142995)	-27.404855
59	(-27.387205 , 34.142995)	2	(6.659690 , 34.142995)	-27.431406	(-0.973054 , 0.230879)	-0.008308	(6.661606 , 34.151079)	-27.404841
60	(6.661606 , 34.151079)	1	(6.661606 , 34.151079)	-27.431406	(-0.204841 , -0.978911)	0.495075	(6.560467 , 33.666445)	-27.417024
60	(-27.404841 , 33.666445)	2	(6.560467 , 33.666445)	-27.431406	(-0.204841 , -0.978911)	0.013196	(6.557790 , 33.653616)	-27.417016
61	(6.557790 , 33.653616)	1	(6.557790 , 33.653616)	-27.431406	(-0.178313 , -0.983974)	0.550501	(6.459628 , 33.111937)	-27.437369
61	(-27.417016 , 33.111937)	2	(6.459628 , 33.111937)	-27.431406	(-0.178313 , -0.983974)	0.004327	(6.458857 , 33.187679)	-27.437367
62	(6.458857 , 33.187679)	1	(6.458857 , 33.187679)	-27.431406	(-0.170573 , -0.985345)	0.031498	(6.453499 , 33.076731)	-27.437464
62	(-27.437464 , 33.076731)	2	(6.453499 , 33.076731)	-27.431406	(-0.170573 , -0.985345)	0.003540	(6.452895 , 33.073242)	-27.437463
63	(6.452895 , 33.073242)	1	(6.452895 , 33.073242)	-27.431406	(-0.059140 , -0.998250)	0.019953	(6.451715 , 33.053324)	-27.438215
63	(-27.437463 , 33.053324)	2	(6.451715 , 33.053324)	-27.431406	(-0.059140 , -0.998250)	0.000694	(6.451674 , 33.052631)	-27.438214
64	(6.451674 , 33.052631)	1	(6.451674 , 33.052631)	-27.431406	(-0.024399 , -0.999702)	0.000251	(6.451668 , 33.052381)	-27.438214
64	(-27.438214 , 33.052381)	2	(6.451668 , 33.052381)	-27.431406	(-0.024399 , -0.999702)	0.000554	(6.451655 , 33.051826)	-27.438213
65	(6.451655 , 33.051826)	1	(6.451655 , 33.051826)	-27.431406	(-0.900840 , -0.434151)	0.000399	(6.452014 , 33.051653)	-27.438231
65	(-27.438213 , 33.051653)	2	(6.452014 , 33.051653)	-27.431406	(-0.434151 , -0.900840)	0.001789	(6.453553 , 33.050911)	-27.437976
66	(6.453553 , 33.050911)	1	(6.453553 , 33.050911)	-27.431406	(-0.627685 , 0.778467)	-0.003007	(6.451666 , 33.048805)	-27.438169
66	(-27.437976 , 33.048805)	2	(6.451666 , 33.048805)	-27.431406	(-0.778467 , 0.627685)	0.000301	(6.451855 , 33.048805)	-27.438167

67	(6.451855 , 33.048805)	1	(6.451855 , 33.048805)	-27.438167	(-0.702125 , -0.712054)	0.000359	(6.451603 , 33.048549)	-27.438171
67	-27.438167	2	(6.451603 , 33.048549)	-27.438171	(-0.712054 , 0.702125)	0.000230	(6.451442 , 33.048386)	-27.438169
68	(6.451442 , 33.048386)	1	(6.451442 , 33.048386)	-27.438169	(-0.975149 , -0.221549)	-0.000045	(6.451485 , 33.048396)	-27.438169
68	-27.438169	2	(6.451485 , 33.048396)	-27.438169	(-0.221549 , 0.975149)	0.000644	(6.450857 , 33.048253)	-27.438136
69	(6.450857 , 33.048253)	1	(6.450857 , 33.048253)	-27.438136	(-0.153380 , 0.988167)	-0.000810	(6.450981 , 33.047453)	-27.438143
69	-27.438136	2	(6.450981 , 33.047453)	-27.438143	(-0.988167 , -0.153380)	-0.000348	(6.451034 , 33.047116)	-27.438141
70	(6.451034 , 33.047116)	1	(6.451034 , 33.047116)	-27.438141	(0.524233 , -0.851575)	0.000059	(6.451064 , 33.047966)	-27.438142
70	-27.438141	2	(6.451064 , 33.047966)	-27.438142	(0.851575 , 0.524233)	0.000275	(6.451208 , 33.046833)	-27.438138
71	(6.451208 , 33.046833)	1	(6.451208 , 33.046833)	-27.438138	(0.942239 , 0.334942)	-0.000025	(6.451185 , 33.046824)	-27.438138
71	-27.438138	2	(6.451185 , 33.046824)	-27.438138	(-0.334942 , 0.942239)	0.000431	(6.451591 , 33.046968)	-27.438125
72	(6.451591 , 33.046968)	1	(6.451591 , 33.046968)	-27.438125	(-0.389005 , 0.921236)	0.001026	(6.451192 , 33.046913)	-27.438157
72	-27.438125	2	(6.451192 , 33.046913)	-27.438157	(0.921236 , 0.389005)	0.000251	(6.451089 , 33.048144)	-27.438155
73	(6.451094 , 33.048144)	1	(6.451094 , 33.048144)	-27.438155	(-0.159154 , 0.987254)	-0.000074	(6.451106 , 33.048071)	-27.438155
73	-27.438155	2	(6.451106 , 33.048071)	-27.438155	(0.987254 , 0.159154)	0.000325	(6.451054 , 33.048392)	-27.438154
74	(6.451054 , 33.048392)	1	(6.451054 , 33.048392)	-27.438154	(0.997994 , -0.063310)	0.000373	(6.451427 , 33.048369)	-27.438168
74	-27.438154	2	(6.451427 , 33.048369)	-27.438168	(0.063310 , 0.997994)	0.005337	(6.456753 , 33.048031)	-27.435485
75	(6.456753 , 33.048031)	1	(6.456753 , 33.048031)	-27.435485	(0.132776 , 0.991146)	0.009730	(6.469995 , 33.146878)	-27.439612
75	-27.435485	2	(6.469995 , 33.146878)	-27.439612	(-0.991146 , 0.132776)	-0.000932	(6.469872 , 33.145954)	-27.439611
76	(6.469872 , 33.145954)	1	(6.469872 , 33.145954)	-27.439611	(0.142033 , 0.989862)	0.003795	(6.470411 , 33.149711)	-27.439616
76	-27.439611	2	(6.470411 , 33.149711)	-27.439616	(0.989862 , -0.142033)	0.001086	(6.470565 , 33.150787)	-27.439615
77	(6.470565 , 33.150787)	1	(6.470565 , 33.150787)	-27.439615	(0.408962 , 0.912551)	0.006040	(6.473035 , 33.156299)	-27.439799
77	-27.439615	2	(6.473035 , 33.156299)	-27.439799	(0.912551 , -0.408962)	-0.000263	(6.472928 , 33.156059)	-27.439798
78	(6.472928 , 33.156059)	1	(6.472928 , 33.156059)	-27.439798	(0.368871 , 0.929481)	0.000647	(6.473161 , 33.156660)	-27.439800
78	-27.439798	2	(6.473161 , 33.156660)	-27.439800	(-0.929481 , -0.368871)	0.000313	(6.473282 , 33.156952)	-27.439799
79	(6.473282 , 33.156952)	1	(6.473282 , 33.156952)	-27.439799	(-0.072720 , 0.997352)	0.002032	(6.473134 , 33.158979)	-27.439828
79	-27.439799	2	(6.473134 , 33.158979)	-27.439828	(-0.997352 , -0.072720)	-0.000236	(6.473151 , 33.158743)	-27.439828
80	(6.473151 , 33.158743)	1	(6.473151 , 33.158743)	-27.439828	(0.042767 , 0.999085)	0.001400	(6.473211 , 33.160141)	-27.439833
80	-27.439828	2	(6.473211 , 33.160141)	-27.439833	(0.999085 , -0.042767)	0.000355	(6.473226 , 33.160496)	-27.439832
81	(6.473226 , 33.160496)	1	(6.473226 , 33.160496)	-27.439832	(0.287878 , 0.957987)	0.009452	(6.475948 , 33.169550)	-27.439916
81	-27.439832	2	(6.475948 , 33.169550)	-27.439916	(0.957987 , -0.287878)	-0.000529	(6.475788 , 33.169843)	-27.439916
82	(6.475788 , 33.169843)	1	(6.475788 , 33.169843)	-27.439916	(0.233065 , 0.972461)	0.015741	(6.479456 , 33.184350)	-27.439963
82	-27.439916	2	(6.479456 , 33.184350)	-27.439963	(-0.972461 , 0.233065)	0.001085	(6.479709 , 33.185405)	-27.439963
83	(6.479709 , 33.185405)	1	(6.479709 , 33.185405)	-27.439963	(0.165648 , 0.986185)	0.061140	(6.489837 , 33.245700)	-27.440417
83	-27.439963	2	(6.489837 , 33.245700)	-27.440417	(-0.986185 , 0.165648)	-0.000653	(6.489729 , 33.245056)	-27.440417
84	(6.489729 , 33.245056)	1	(6.489729 , 33.245056)	-27.440417	(0.176168 , 0.984360)	0.010394	(6.491561 , 33.252588)	-27.440425
84	-27.440417	2	(6.491561 , 33.252588)	-27.440425	(0.984360 , -0.176168)	0.000829	(6.491766 , 33.251604)	-27.440425
85	(6.491706 , 33.251604)	1	(6.491706 , 33.251604)	-27.440425	(0.253832 , 0.967248)	0.016029	(6.495775 , 33.271608)	-27.440529
85	-27.440425	2	(6.495775 , 33.271608)	-27.440529	(0.967248 , -0.253832)	-0.000132	(6.495741 , 33.271480)	-27.440529
86	(6.495741 , 33.271480)	1	(6.495741 , 33.271480)	-27.440529	(0.245872 , 0.969302)	0.000399	(6.495839 , 33.271867)	-27.440529
86	-27.440529	2	(6.495839 , 33.271867)	-27.440529	(-0.969302 , 0.245872)	0.000173	(6.495882 , 33.272035)	-27.440529
87	(6.495882 , 33.272035)	1	(6.495882 , 33.272035)	-27.440529	(-0.159529 , 0.987193)	0.000539	(6.495796 , 33.272567)	-27.440533
87	-27.440529	2	(6.495796 , 33.272567)	-27.440533	(-0.987193 , -0.159529)	-0.000045	(6.495883 , 33.272523)	-27.440533
88	(6.495883 , 33.272523)	1	(6.495883 , 33.272523)	-27.440533	(-0.077301 , 0.997008)	0.000093	(6.495796 , 33.272615)	-27.440533
88	-27.440533	2	(6.495796 , 33.272615)	-27.440533	(0.997008 , 0.077301)	0.000059	(6.495791 , 33.272674)	-27.440533
89	(6.495791 , 33.272674)	1	(6.495791 , 33.272674)	-27.440533	(0.467326 , 0.884085)	0.000251	(6.495908 , 33.272895)	-27.440534
89	-27.440533	2	(6.495908 , 33.272895)	-27.440534	(0.884085 , -0.467326)	-0.000025	(6.495897 , 33.272873)	-27.440534
90	(6.495897 , 33.272873)	1	(6.495897 , 33.272873)	-27.440534	(0.377250 , 0.926111)	0.000182	(6.495935 , 33.272968)	-27.440534
90	-27.440534	2	(6.495935 , 33.272968)	-27.440534	(-0.926111 , -0.377250)	0.000035	(6.495948 , 33.273000)	-27.440534
91	(6.495948 , 33.273000)	1	(6.495948 , 33.273000)	-27.440534	(0.053276 , 0.998580)	0.000703	(6.495986 , 33.273702)	-27.440535
91	-27.440534	2	(6.495986 , 33.273702)	-27.440535	(-0.998580 , -0.053276)	-0.000045	(6.495983 , 33.273567)	-27.440535
92	(6.495983 , 33.273567)	1	(6.495983 , 33.273567)	-27.440535	(0.116673 , 0.993170)	0.000631	(6.496057 , 33.274284)	-27.440535
92	-27.440535	2	(6.496057 , 33.274284)	-27.440535	(0.993170 , -0.116673)	0.000102	(6.496069 , 33.274385)	-27.440535
93	(6.496069 , 33.274385)	1	(6.496069 , 33.274385)	-27.440535	(0.273352 , 0.961914)	0.002277	(6.496691 , 33.276576)	-27.440539
93	-27.440535	2	(6.496691 , 33.276576)	-27.440535	(0.961914 , -0.273352)	-0.000097	(6.496665 , 33.276482)	-27.440539
94	(6.496665 , 33.276482)	1	(6.496665 , 33.276482)	-27.440539	(0.232244 , 0.972658)	0.002069	(6.497146 , 33.278495)	-27.440539
94	-27.440539	2	(6.497146 , 33.278495)	-27.440539	(-0.972658 , 0.232244)	0.000173	(6.497186 , 33.278663)	-27.440539
95	(6.497186 , 33.278663)	1	(6.497186 , 33.278663)	-27.440539	(0.150487 , 0.988612)	0.000524	(6.498017 , 33.284125)	-27.440546
95	-27.440539	2	(6.498017 , 33.284125)	-27.440546	(-0.988612 , 0.150487)	-0.000099	(6.498002 , 33.284027)	-27.440546
96	(6.498002 , 33.284027)	1	(6.498002 , 33.284027)	-27.440546	(0.168216 , 0.985750)	0.001511	(6.498256 , 33.285516)	-27.440547
96	-27.440546	2	(6.498256 , 33.285516)	-27.440547	(0.985750 , -0.168216)	0.000102	(6.498273 , 33.285616)	-27.440547
97	(6.498273 , 33.285616)	1	(6.498273 , 33.285616)	-27.440547	(0.234127 , 0.972206)	0.000410	(6.499212 , 33.289515)	-27.440550
97	-27.440547	2	(6.499212 , 33.289515)	-27.440550	(0.972206 , -0.234127)	-0.000025	(6.499206 , 33.289491)	-27.440550
98	(6.499206 , 33.289491)	1	(6.499206 , 33.289491)	-27.440550	(0.228059 , 0.973647)	0.000176	(6.499247 , 33.289662)	-27.440550
98	-27.440550	2	(6.499247 , 33.289662)	-27.440550	(-0.973647 , 0.228059)	0.000035	(6.499255 , 33.289596)	-27.440550
99	(6.499255 , 33.289596)	1	(6.499255 , 33.289596)	-27.440550	(0.032296 , 0.999478)	0.000325	(6.499265 , 33.290021)	-27.440550
99	-27.440550	2	(6.499265 , 33.290021)	-27.440550	(-0.999478 , 0.032296)	0.000005	(6.499265 , 33.290026)	-27.440550
100	(6.499265 , 33.290026)	1	(6.499265 , 33.290026)	-27.440550	(0.016385 , 0.999866)	0.000028	(6.499266 , 33.290054)	-27.440550
100	-27.440550	2	(6.499266 , 33.290054)	-27.440550	(-0.999866 , 0.016385)	0.000005	(6.499266 , 33.290059)	-27.440550

**Source Code:**

```
from prettytable import PrettyTable
import math
filename = "output.txt"
f = open(filename, 'w+')

t = PrettyTable(['k', 'x f(x)', 'j', 'd', 'y(j)', 'landa', 'y(j+1)'])

class GoldenSection:

    def __init__(self, I):
        self.index = 0
        self.L = I
        self.a = 0
        self.b = 0
        self.landaa = 0
        self.miua = 0
        self.f_landaa = 0
        self.f_miua = 0
        self.answer = 0
        self.f_answer = 0
        self.alfa = 0.618
        self.y = []
        self.d = []

    def initialStep(self):
        self.landaa = self.a + (1.0 - self.alfa) * (self.b - self.a)
        self.miua = self.a + (self.alfa * (self.b - self.a))
        self.f_landaa = self.function1(self.landaa)
        self.f_miua = self.function1(self.miua)
        self.index = 1
```

```
def mainStep(self):  
    if self.b - self.a < self.L:  
        self.answer = (self.a + self.b) / 2  
        self.f_answer = self.function1(self.answer)  
        return  
    elif self.f_landa > self.f_miuo:  
        self.step2()  
    elif self.f_landa <= self.f_miuo:  
        self.step3()  
  
def step2(self):  
    self.a = self.landa  
    self.landa = self.miuo  
    self.f_landa = self.f_miuo  
    self.miuo = self.a + (self.alfa * (self.b - self.a))  
    self.f_miuo = self.function1(self.miuo)  
    self.step4()  
  
def step3(self):  
    self.b = self.miuo  
    self.miuo = self.landa  
    self.f_miuo = self.f_landa  
    self.landa = self.a + ((1.0 - self.alfa) * (self.b - self.a))  
    self.f_landa = self.function1(self.landa)  
    self.step4()  
  
def step4(self):  
    self.index+=1  
    self.mainStep()  
  
def function1(self, x):  
    result = 0.0  
    temp1 = (5 * (self.y[0] + x * self.d[0])) - (self.y[1] + x *  
self.d[1])
```

```
temp2 = self.y[0] + x * self.d[0] - 2
temp3 = (self.y[0] + x * self.d[0]) - (2 * (self.y[1] + x *
self.d[1]))
result = temp1 ** 4 + temp2 ** 2 + temp3 + 12
return result

class CyclicCoordinate:

    def __init__(self, input):
        self.epsilon = 0.001
        self.d1 = [1,0]
        self.d2 = [0,1]
        self.x = input[:]
        self.y = []
        self.f_x = 0
        self.j = 0
        self.k = 0
        self.landau = 0

    def initialStep(self):
        self.y = self.x[:]
        self.k = 1
        self.j = 1

    def mainStep(self):
        tempY = []

        while self.j <= 2:
            gs = GoldenSection(0.001)
            gs.a = -9.0
            gs.b = 2.0
            gs.y = self.y[:]
```

```

        if self.j == 1:
            gs.d = self.d1[:]
        else:
            gs.d = self.d2[:]
        gs.initialStep()
        gs.mainStep()
        self.landa = gs.answer
        if self.j == 1:
            tempY = self.y[:]
            self.y[0] = tempY[0] + (self.landa * self.d1[0])
            self.y[1] = tempY[1] + (self.landa * self.d1[1])
            t.addRow([str(self.k), "(" + str('{0:.6f}'.format(self.x[0])) +
+ " , " + str('{0:.6f}'.format(self.x[1])) + ")",
                     self.j, "(" +
                     str(self.d1[0]) + " , " + str(self.d1[1]) + ")",
                     "(" +
                     str('{0:.6f}'.format(tempY[0])) + " , " + str('{0:.6f}'.format(tempY[1])) +
                     ")",
                     '{0:.6f}'.format(self.landa),
                     "(" + str('{0:.6f}'.format(self.y[0])) + " ,
+ " + str('{0:.6f}'.format(self.y[1])) + ")"])
        elif self.j == 2:
            tempY = self.y[:]
            self.y[0] = tempY[0] + (self.landa * self.d2[0])
            self.y[1] = tempY[1] + (self.landa * self.d2[1])
            self.f_x = self.function(self.x)
            t.addRow([str(self.k), str('{0:.6f}'.format(self.f_x)),
                     self.j, "(" + str(self.d2[0]) + " , " + str(self.d2[1]) + ")",
                     "(" +
                     str('{0:.6f}'.format(tempY[0])) + " , " + str('{0:.6f}'.format(tempY[1])) +
                     ")",
                     '{0:.6f}'.format(self.landa),
                     "(" + str('{0:.6f}'.format(self.y[0])) + " ,
+ " + str('{0:.6f}'.format(self.y[1])) + ")"])
            self.j+=1
            self.step2()

    def step2(self):
        tempX = []
        tempX = self.x[:]

```

```
    self.x = self.y[:]
    minusX = [0.0,0.0]
    minusX[0] = self.x[0] - tempX[0]
    minusX[1] = self.x[1] - tempX[1]
    norm2 = self.Norm2(minusX)
    if norm2 < self.epsilon:
        return False
    else:
        self.y = self.x[:]
        self.j = 1
        self.k+=1
        return self.mainStep()

def Norm2(self, param):
    temp = param[0] ** 2 + param[1] ** 2
    result = math.sqrt(temp)
    return result

def function(self, x):
    result = 0
    temp1 = 5 * x[0] - x[1]
    temp2 = x[0] - 2
    temp3 = x[0] - (2 * x[1])
    result = temp1 ** 4 + temp2 ** 2 + temp3 + 12
    return result

cyclic = CyclicCoordinate([6,34])
cyclic.initialStep()
cyclic.mainStep()
f.write("-" * 20 + " Cyclic Coordinate " + "-" * 20 + "\n\n")
f.write(t.get_string())
```

```
t1 = PrettyTable(['k', 'x f(x)', 'j', 'y(j)', 'd(j)', 'landa', 'y(j+1)', 'd',  
'landa_had', 'y(j) + landa_had*d'])  
  
class HookeAndJeeves:  
  
    def __init__(self, input):  
        self.epsilon = 0.0001  
        self.d1 = [1,0]  
        self.d2 = [0,1]  
        self.x = input[:]  
        self.x_previous = self.x[:]  
        self.y = []  
        self.f_x = 0  
        self.j = 0  
        self.k = 0  
        self.land_a = 0  
        self.answer = 0  
        self.tempY = [0.0, 0.0]  
  
    def initialStep(self):  
        self.y = self.x[:]  
        self.k = 1  
        self.j = 1  
  
    def mainStep(self):  
        while self.j <= 2:  
            gs = GoldenSection(0.0001)  
            gs.a = -9.0  
            gs.b = 2.0  
            gs.y = self.y[:]  
  
            if self.j == 1:  
                gs.d = self.d1[:]  
            else:  
                gs.d = self.d2[:]
```

```

        gs.d = self.d2[:]

        gs.initialStep()

        gs.mainStep()

        self.landa = gs.answer

        if self.j == 1:

            self.tempY = self.y[:]

            self.y[0] = self.tempY[0] + (self.landa * self.d1[0])
            self.y[1] = self.tempY[1] + (self.landa * self.d1[1])

            t1.add_row([str(self.k), "(" +
str('{0:.6f}'.format(self.x[0])) + " , " + str('{0:.6f}'.format(self.x[1])) +
")", self.j, "(" + str('{0:.6f}'.format(self.tempY[0])) + " , " +
str('{0:.6f}'.format(self.tempY[1])) + ")" , "(" + str(self.d1[0]) + " , " +
str(self.d1[1]) + ")" , '{0:.6f}'.format(self.landa), "(" +
str('{0:.6f}'.format(self.y[0])) + " , " + str('{0:.6f}'.format(self.y[1])) +
")", "—" , "—" , "—" ])

        elif self.j == 2:

            self.tempY = self.y[:]

            self.y[0] = self.tempY[0] + (self.landa * self.d2[0])
            self.y[1] = self.tempY[1] + (self.landa * self.d2[1])

            self.f_x = self.function(self.x)

            self.j+=1

        self.j = 2

        self.x_previous = self.x[:]

        self.x = self.y[:]

        if not self.haltCondition(self.x_previous, self.x):

            return False

        else:

            self.step2()

    def haltCondition(self, a, b):

        minus = [0.0, 0.0]

        minus[0] = b[0] - a[0]
        minus[1] = b[1] - a[1]

        norm2 = self.Norm2(minus)

```

```

    if norm2 < self.epsilon:
        return False
    else:
        return True

def Norm2(self, param):
    temp = param[0] ** 2 + param[1] ** 2
    result = math.sqrt(temp)
    return result

def step2(self):
    d = [0.0, 0.0]
    d[0] = self.x[0] - self.x_previous[0]
    d[1] = self.x[1] - self.x_previous[1]
    gs2 = GoldenSection(0.001)
    gs2.a = -9.0
    gs2.b = 2.0
    gs2.d = d[:]
    gs2.y = self.x[:]
    gs2.initialStep()
    gs2.mainStep()
    self.answer = gs2.answer
    y2 = [0.0, 0.0]
    y2[0] = self.x[0] + (self.answer * d[0])
    y2[1] = self.x[1] + (self.answer * d[1])
    t1.add_row([str(self.k), str('{0:.6f}'.format(self.f_x)), self.j, "("
+ str('{0:.6f}'.format(self.tempY[0])) + " , " +
str('{0:.6f}'.format(self.tempY[1])) + ") ", "(" + str(self.d2[0]) + " , " +
str(self.d2[1]) + ") ", '{0:.6f}'.format(self.landa), "(" +
str('{0:.6f}'.format(self.y[0])) + " , " + str('{0:.6f}'.format(self.y[1])) +
") ", "(" + str('{0:.6f}'.format(d[0])) + " , " + str('{0:.6f}'.format(d[1])) +
") ", '{0:.6f}'.format(self.answer), "(" + str('{0:.6f}'.format(y2[0])) + " ,
" + str('{0:.6f}'.format(y2[1])) + ")"])
    self.y = y2[:]
```

```

    self.k+=1
    self.j=1
    return self.mainStep()

def function(self, x):
    result = 0
    temp1 = 5 * x[0] - x[1]
    temp2 = x[0] - 2
    temp3 = x[0] - (2 * x[1])
    result = temp1 ** 4 + temp2 ** 2 + temp3 + 12
    return result

hookie = HookeAndJeeves([6,34])
hookie.initialStep()
hookie.mainStep()
f.write("\n\n" + "-" * 20 + " Hooke And Jeeves " + "-" * 20 + "\n\n")
f.write(t1.get_string())

t2 = PrettyTable(['k', 'x f(x)', 'j', 'y(j)', 'f(y(j))', 'd(j)', 'landa(j)', 'y(j+1)', 'f(y(j+1))'])

class SteepestandDescent:

    def __init__(self, input):
        self.epsilon = 0.0001
        self.d1 = [1,0]
        self.d2 = [0,1]
        self.x = input[:]
        self.landai = 0
        self.landaj = 0
        self.y = []
        self.x_previous = []

```

```
    self.f_x = 0
    self.f_y = 0
    self.j = 0
    self.k = 0
    self.answer = 0

def initialStep(self):
    self.y = self.x[:]
    self.k = 1
    self.j = 1

def mainStep(self):
    temp_y = []

    while self.j <= 2:
        gs = GoldenSection(0.0001)
        gs.a = -9.0
        gs.b = 2.0
        gs.y = self.y[:]

        if self.j == 1:
            gs.d = self.d1[:]
            gs.initialStep()
            gs.mainStep()
            self.landa1 = gs.answer
            temp_y = self.y[:]
            self.y[0] = temp_y[0] + (self.landa1 * self.d1[0])
            self.y[1] = temp_y[1] + (self.landa1 * self.d1[1])
            f_temp_y = self.function(temp_y)
            self.f_y = self.function(self.y)
            t2.add_row([str(self.k), "(" +
str('{0:.6f}'.format(self.x[0])) + ", " + str('{0:.6f}'.format(self.x[1])) +
")", self.j, "(" + str('{0:.6f}'.format(temp_y[0])) + ", " + " +
str('{0:.6f}'.format(temp_y[1])) + ")", '{0:.6f}'.format(f_temp_y), "(" +
```

```

str('{0:.6f}'.format(self.d1[0])) + " , " + str('{0:.6f}'.format(self.d1[1]))
+ ") " , '{0:.6f}'.format(self.landat1) , "(" + str('{0:.6f}'.format(self.y[0]))
+ " , " + str('{0:.6f}'.format(self.y[1])) + ")",
'{0:.6f}'.format(self.f_y))
elif self.j == 2:
    gs.d = self.d2[:]
    gs.initialStep()
    gs.mainStep()
    self.landat2 = gs.answer
    temp_y = self.y[:]
    self.y[0] = temp_y[0] + (self.landat2 * self.d1[0])
    self.y[1] = temp_y[1] + (self.landat2 * self.d1[1])
    f_temp_y = self.function(temp_y)
    self.f_y = self.function(self.y)
    self.f_x = self.function(self.x)
    t2.addRow([str(self.k), str('{0:.6f}'.format(self.f_x)),
self.j, "(" + str('{0:.6f}'.format(temp_y[0])) + " , " +
str('{0:.6f}'.format(temp_y[1])) + ")",
'{0:.6f}'.format(f_temp_y), "(" +
str('{0:.6f}'.format(self.d2[0])) + " , " + str('{0:.6f}'.format(self.d2[1])),
+ ") " , '{0:.6f}'.format(self.landat2) , "(" + str('{0:.6f}'.format(self.y[0])),
+ " , " + str('{0:.6f}'.format(self.y[1])) + ")",
'{0:.6f}'.format(self.f_y))

    self.j+=1

    self.x_previous = self.x[:]
    self.x = self.y[:]
    if not self.haltCondition(self.x_previous, self.x):
        return False
    else:
        self.y = self.x[:]
        self.k+=1
        self.j=1
        self.step3()

```

```
def haltCondition(self, a, b):  
    minus = [0.0, 0.0]  
    minus[0] = b[0] - a[0]  
    minus[1] = b[1] - a[1]  
    norm2 = self.Norm2(minus)  
    if norm2 < self.epsilon:  
        return False  
    else:  
        return True  
  
def Norm2(self, param):  
    temp = param[0] ** 2 + param[1] ** 2  
    result = math.sqrt(temp)  
    return result  
  
def step3(self):  
    aj1 = [0.0, 0.0]  
    aj2 = [0.0, 0.0]  
    bj1 = [0.0, 0.0]  
    bj2 = [0.0, 0.0]  
    if self.landal == 0:  
        aj1 = self.d1[:]  
    else:  
        aj1[0] = (self.landal * self.d1[0]) + (self.landaa * self.d2[0])  
        aj1[1] = (self.landal * self.d1[1]) + (self.landaa * self.d2[1])  
  
    bj1 = aj1[:]  
    bj1Norm2 = self.Norm2(bj1)  
    self.d1[0] = bj1[0] / bj1Norm2  
    self.d1[1] = bj1[1] / bj1Norm2  
  
    if self.landaa == 0:  
        aj2 = self.d2[:]
```

```
    else:
        aj2[0] = (self.land2 * self.d2[0])
        aj2[1] = (self.land2 * self.d2[1])

        bj2[0] = aj2[0] - (((aj2[0] * self.d1[0]) + (aj2[1] * self.d1[1])) *
self.d1[0])
        bj2[1] = aj2[1] - (((aj2[0] * self.d1[0]) + (aj2[1] * self.d1[1])) *
self.d1[1])
        bj2Norm2 = self.Norm2(bj2)
        self.d2[0] = bj2[0] / bj2Norm2
        self.d2[1] = bj2[1] / bj2Norm2
        return self.mainStep()

    def function(self, x):
        result = 0
        temp1 = 5 * x[0] - x[1]
        temp2 = x[0] - 2
        temp3 = x[0] - (2 * x[1])
        result = temp1 ** 4 + temp2 ** 2 + temp3 + 12
        return result

steepest = SteepestandDescent([6,34])
steepest.initialStep()
steepest.mainStep()
f.write("\n\n" + "-" * 20 + "  Steepest And Descent  " + "-" * 20 + "\n\n")
f.write(t2.get_string())
f.close()
```

Due: Jun 26 23:59

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