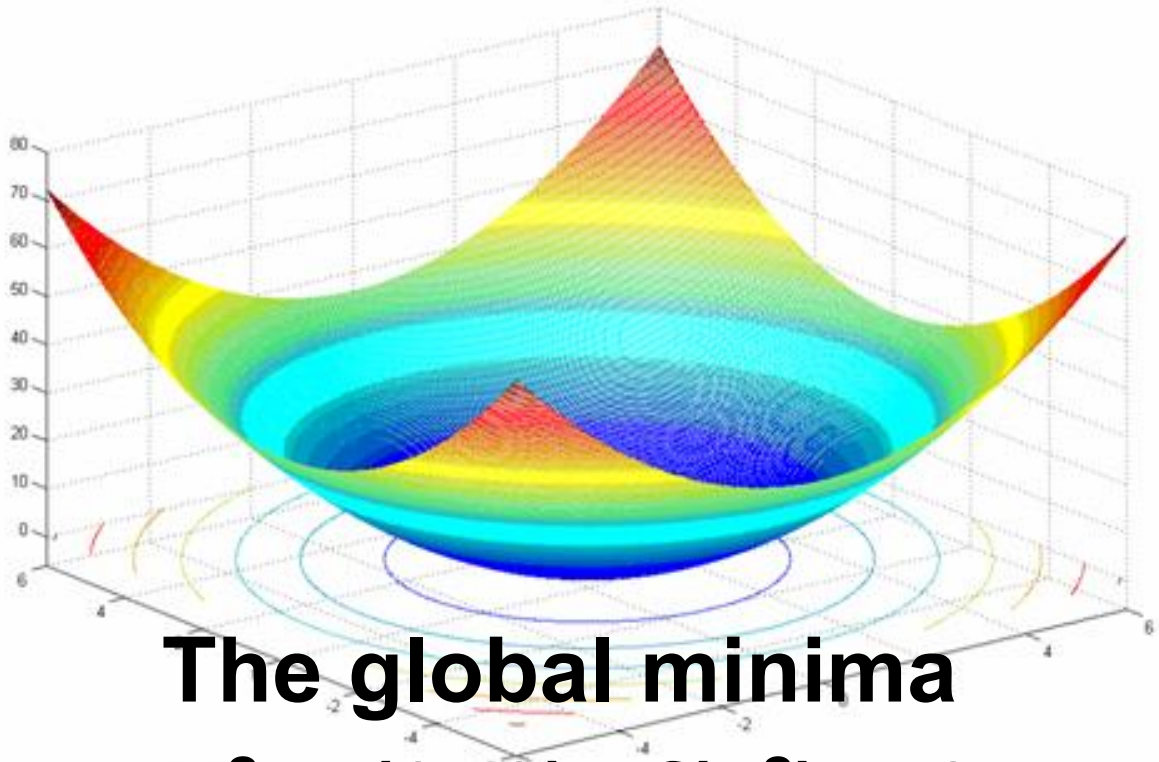
SOFT COMPUTING

PARTICLE SWARM OPTIMIZATION

SPHERE FUNCTION
&
RASTRIGIN FUNCTION

M10159011 杜雪吟

SPHERE FUNCTION



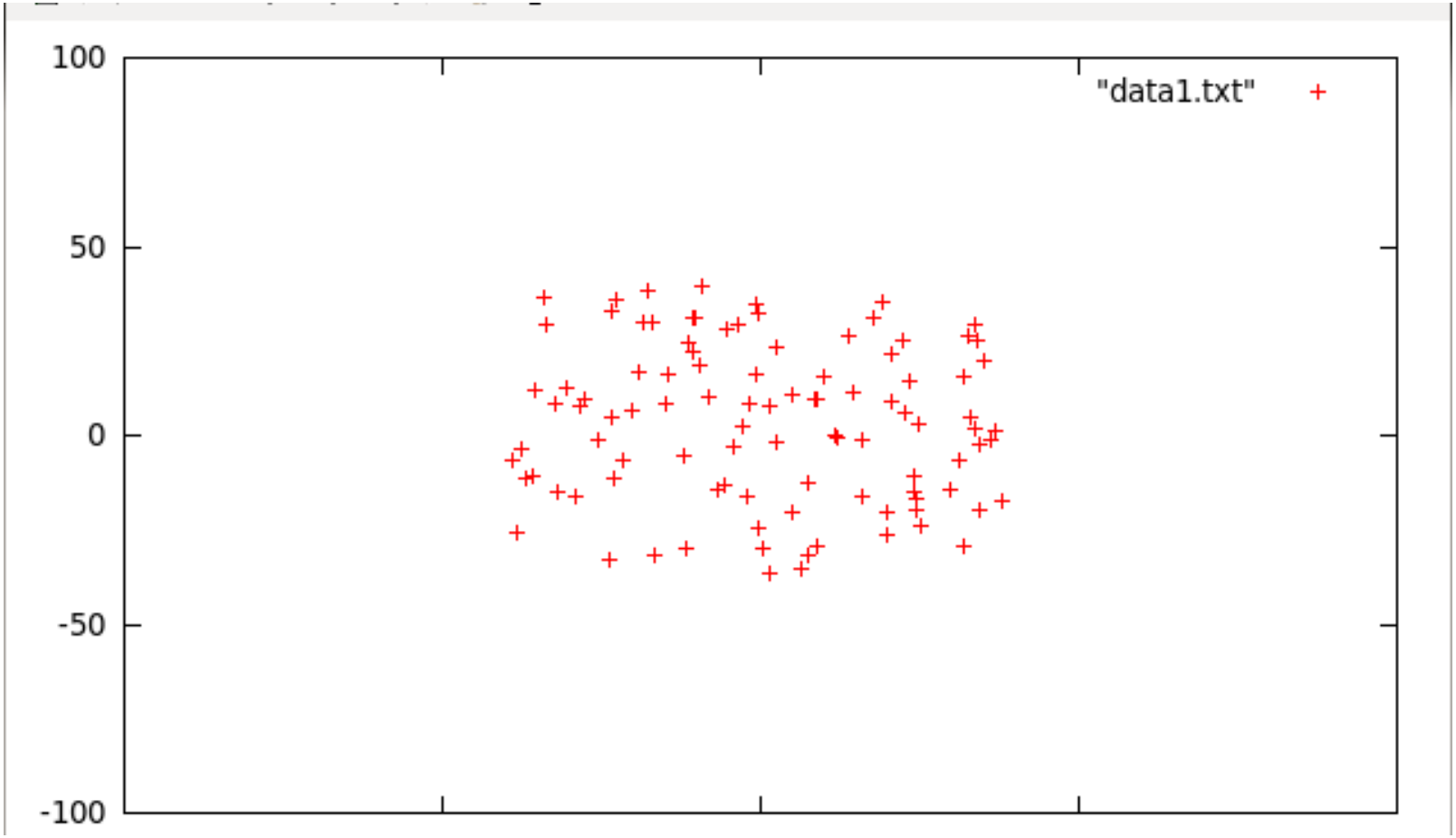
The global minima

$X^2 = (0, 0)$, $f(x^2) = 0$

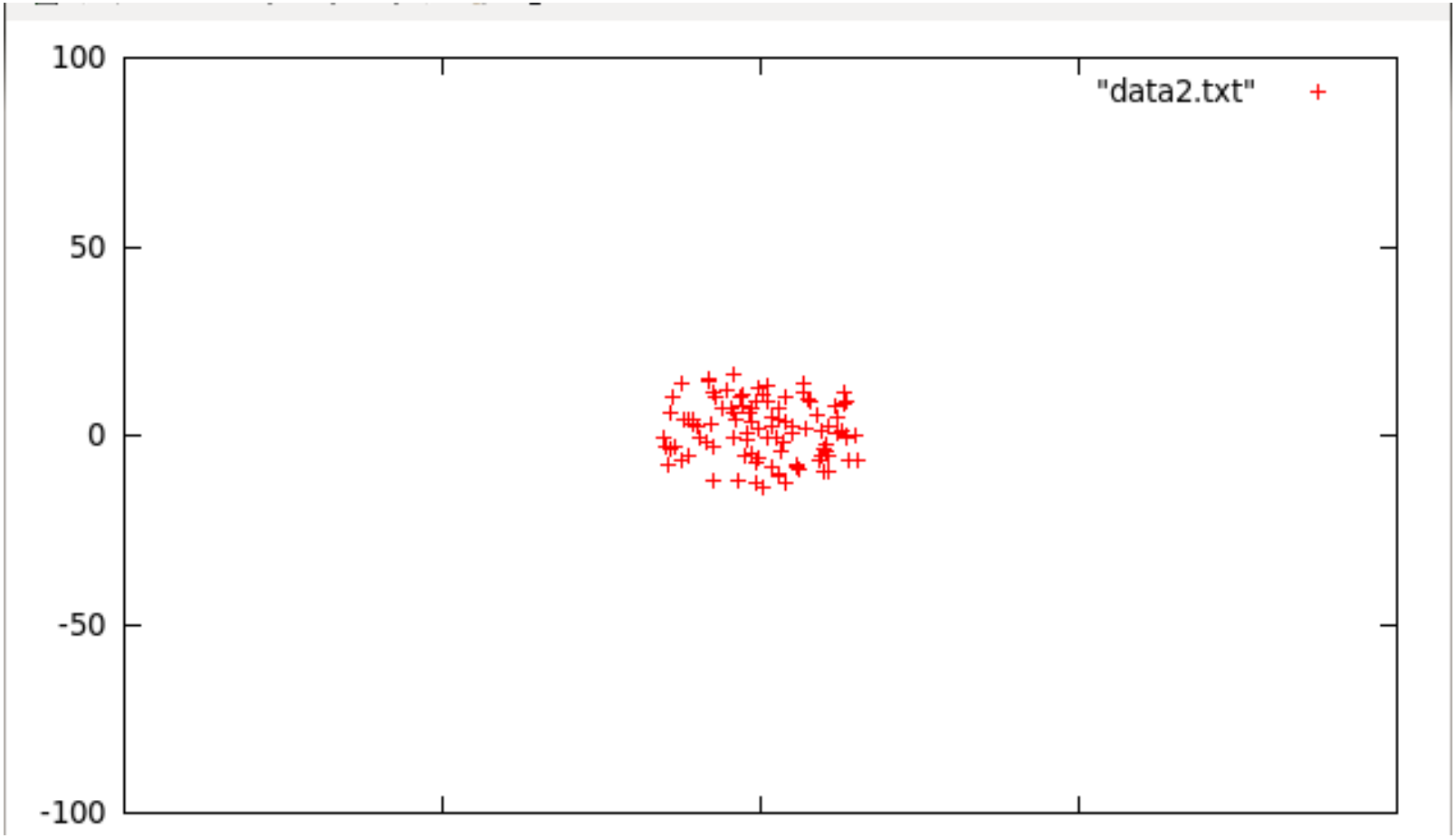
SPHERE FUNCTION - PARAMETERS

- Particle number: 100
- Search domain: $-100 < X_i < 100$
- C_1: 2
- C_2: 2
- $Rand_1$: 0.26159124447458926
- $Rand_2$: 0.056226893824293245
- V_0: [0, 0]
- W: 0
- Terminate condition: t = 100

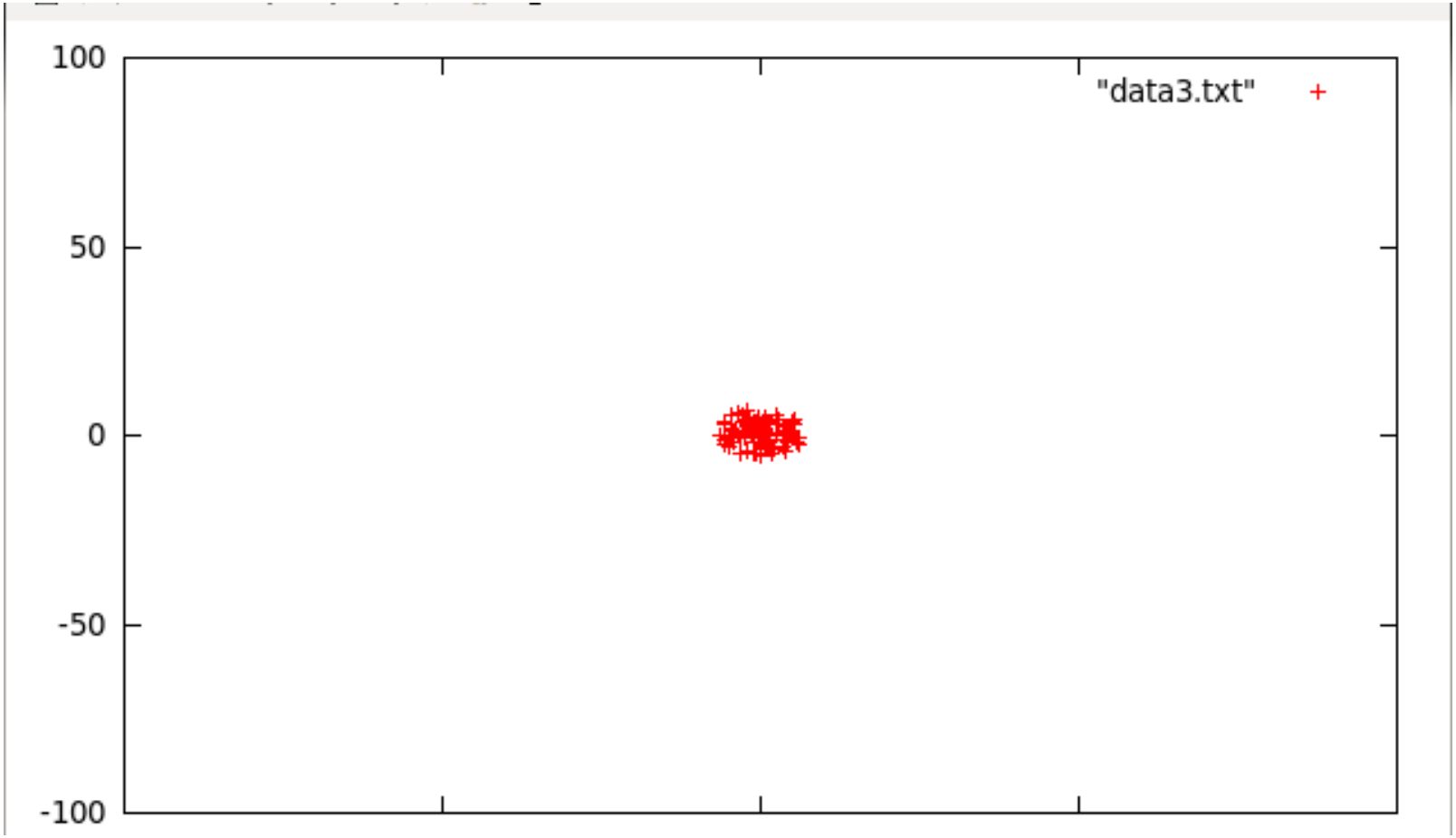
SPHERE FUNCTION - PROCESS (1/7)



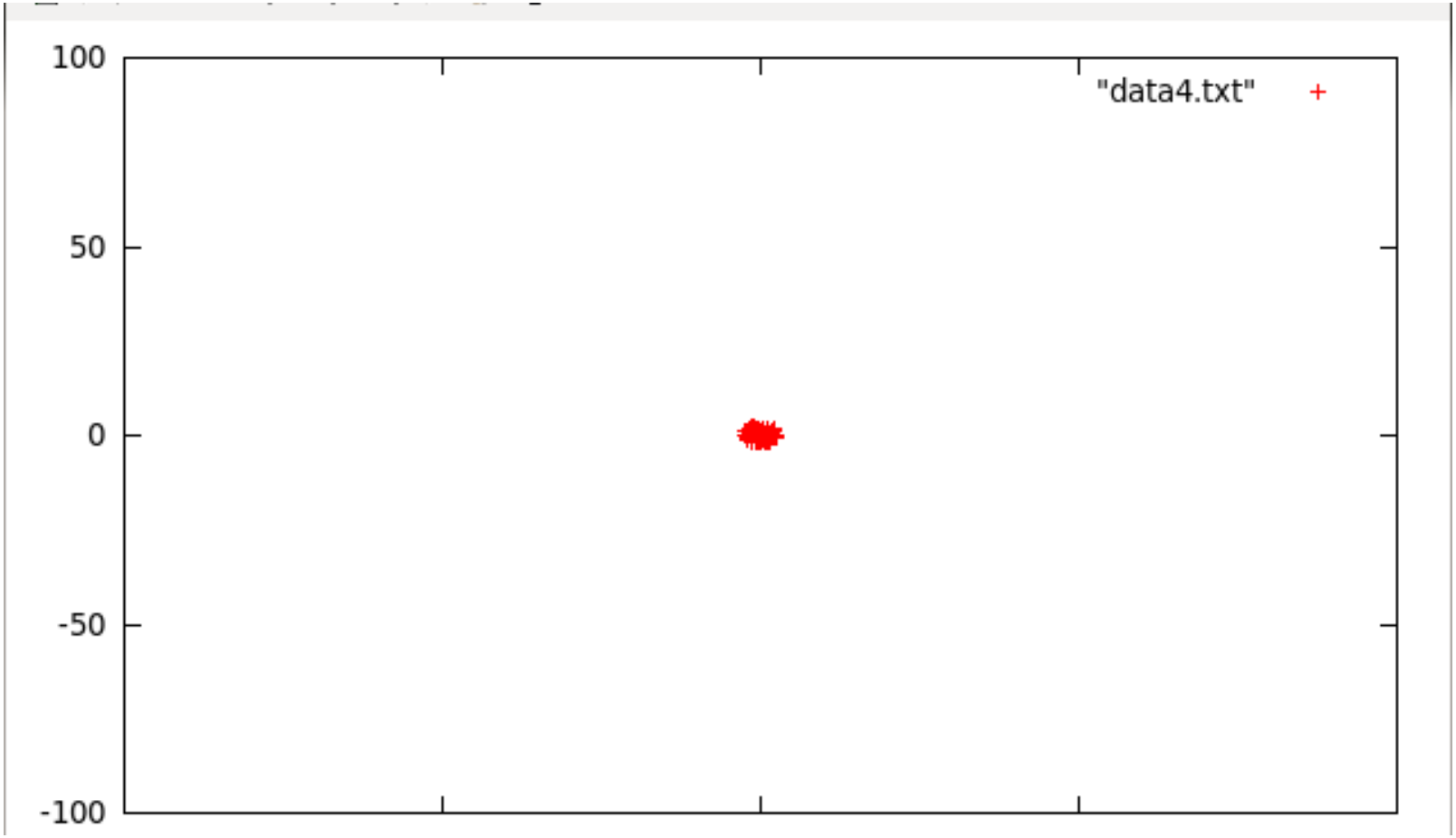
SPHERE FUNCTION - PROCESS (2/7)



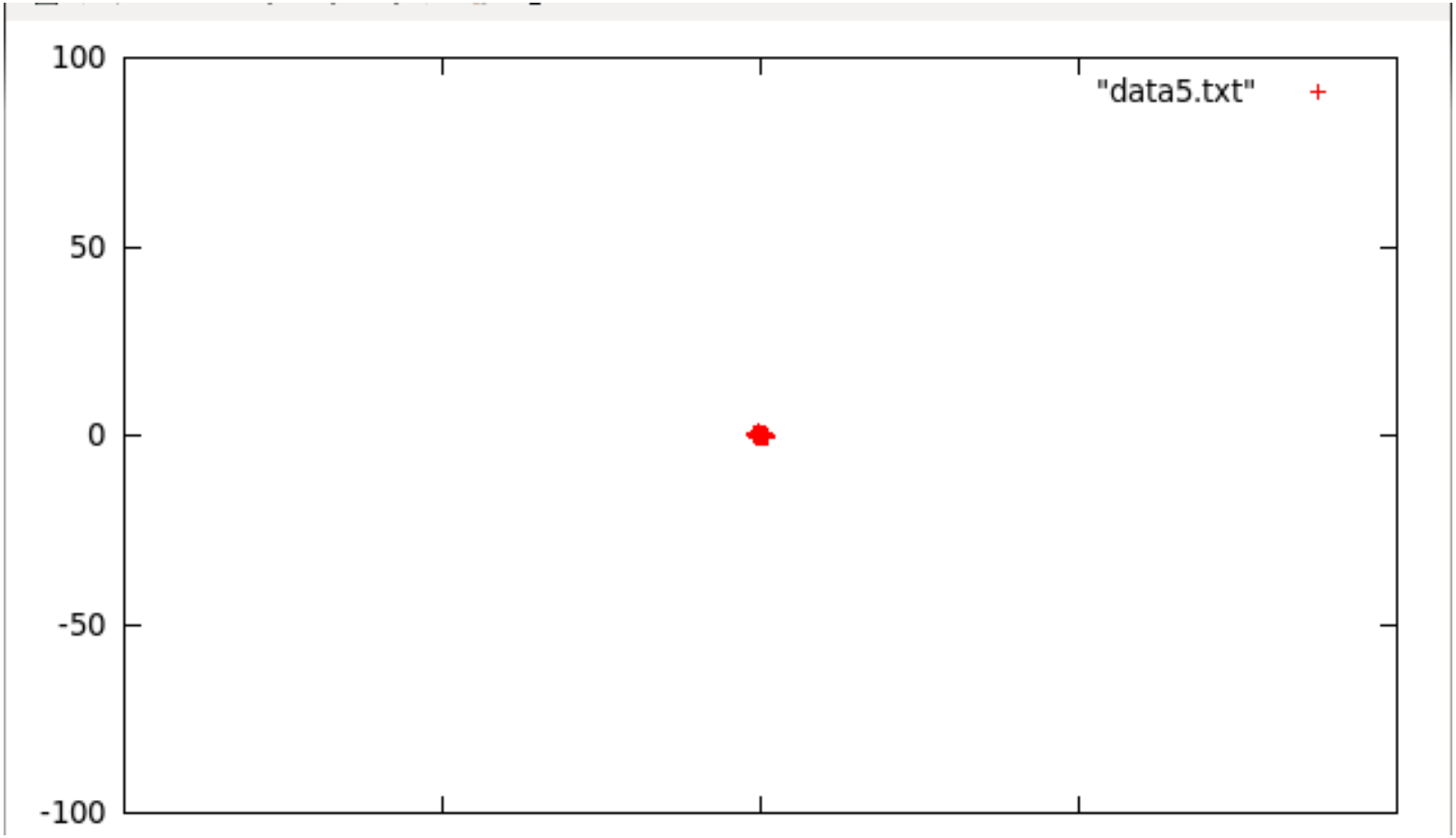
SPHERE FUNCTION - PROCESS (3/7)



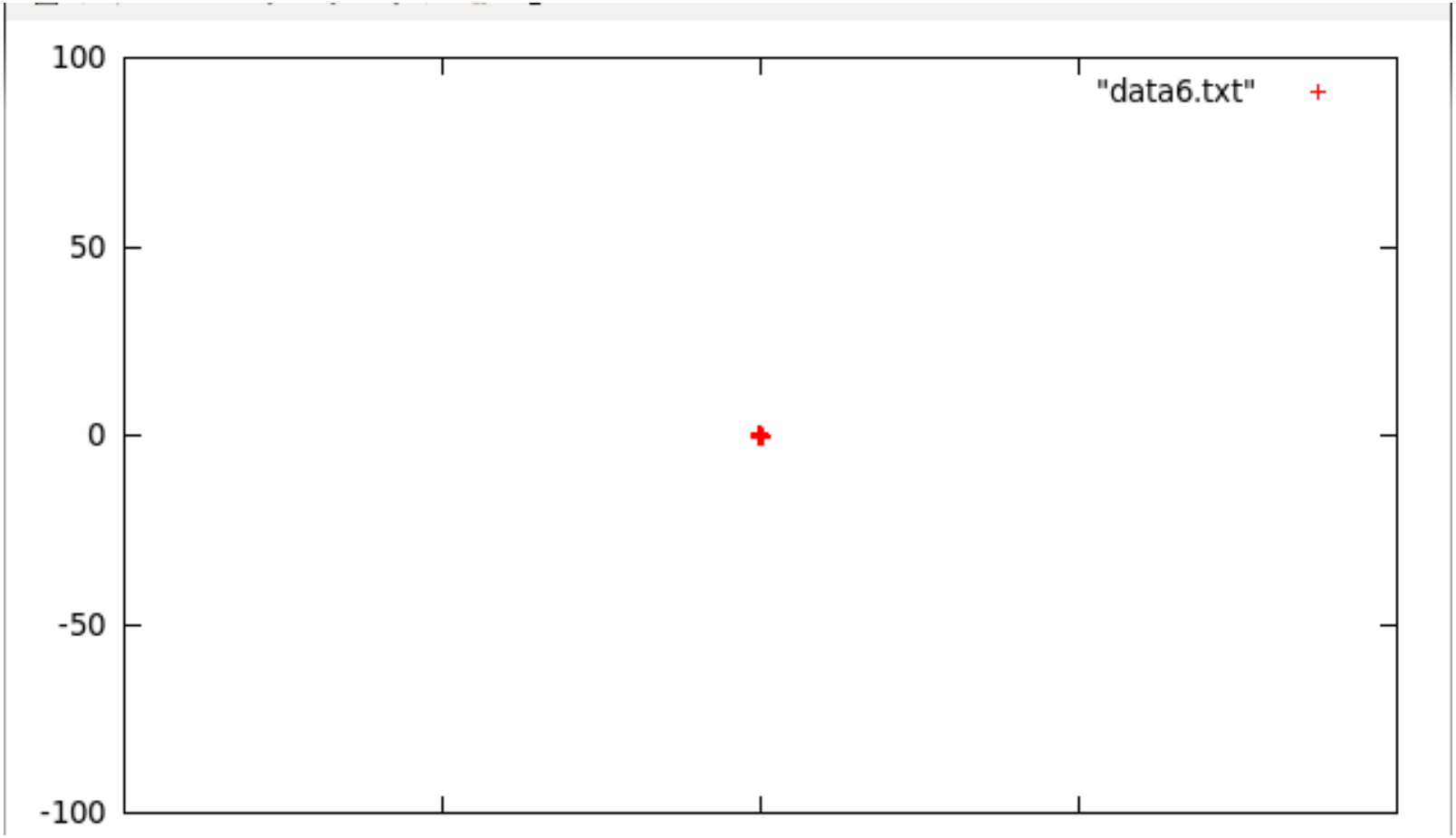
SPHERE FUNCTION - PROCESS (4/7)



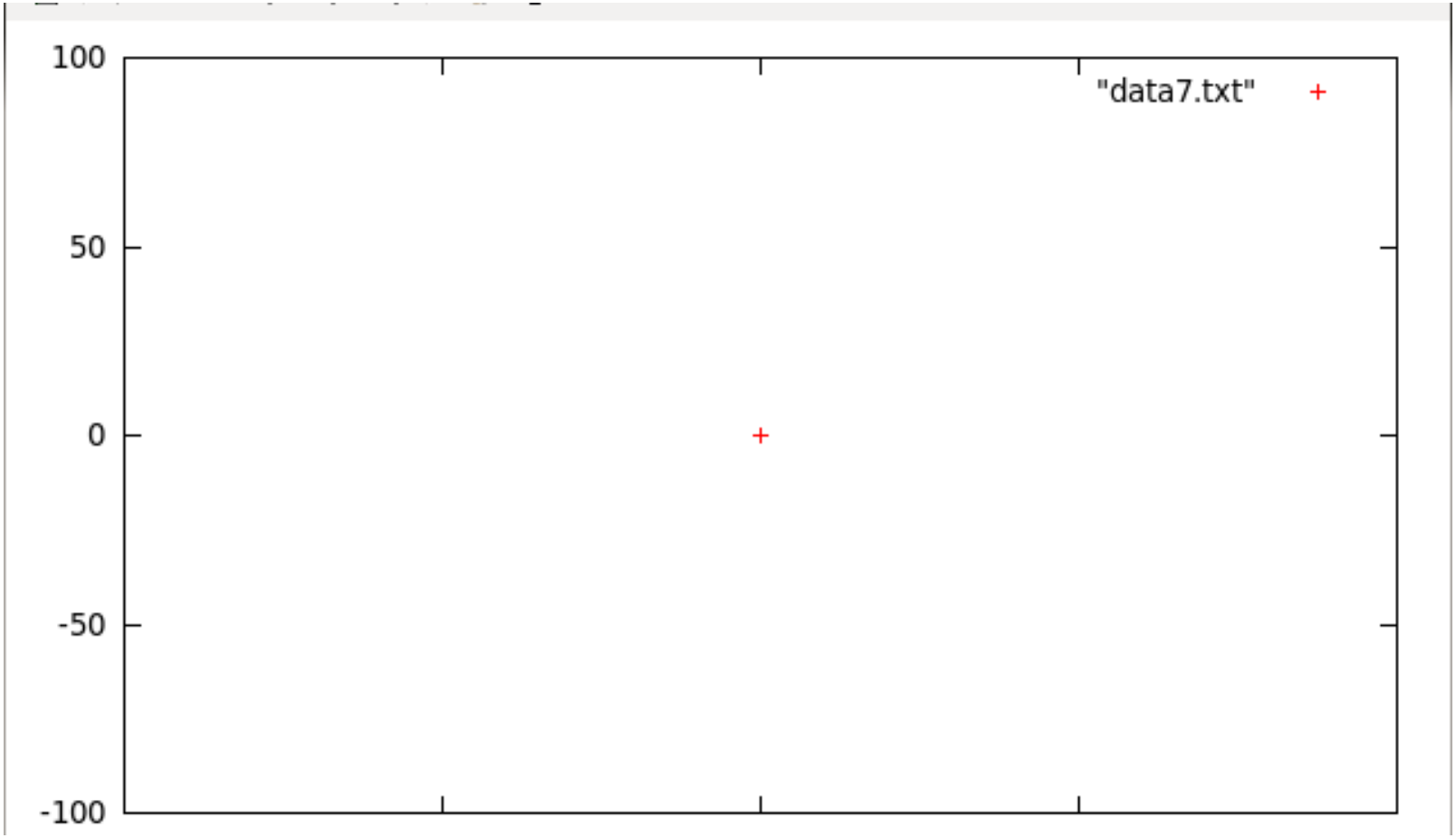
SPHERE FUNCTION - PROCESS (5/7)



SPHERE FUNCTION - PROCESS (6/7)



SPHERE FUNCTION - PROCESS (7/7)



SPHERE FUNCTION - STATISTICS

```
8.954694519773245e-26
2.383705190517470 6e-55
4.91747111081702
9.9340218650671 87e-68
3.8741907100445204e-100
1.848394408619695e-21
4.1786321193780 73e-89
3.298642562502195e-176
6.026433130275365e-08
9.900758765907955e-63
"group_mean=0.491747117108 1352"
2.176336985387 8367
```

N=20

```
5.776231305897526e-59
3.674774590208067e-99
7.680971308938694e-05
1.2445923942744008e-80
1.0152575996772368e-51
2.6360068772437 95e-18
5.522157561815172e-94
3.713068681234023e-74
4.3336295095930425e-58
1.0364073986352157e-12
"group_mean=7.680971412579698e-06"
5.309758806465277e-10
```

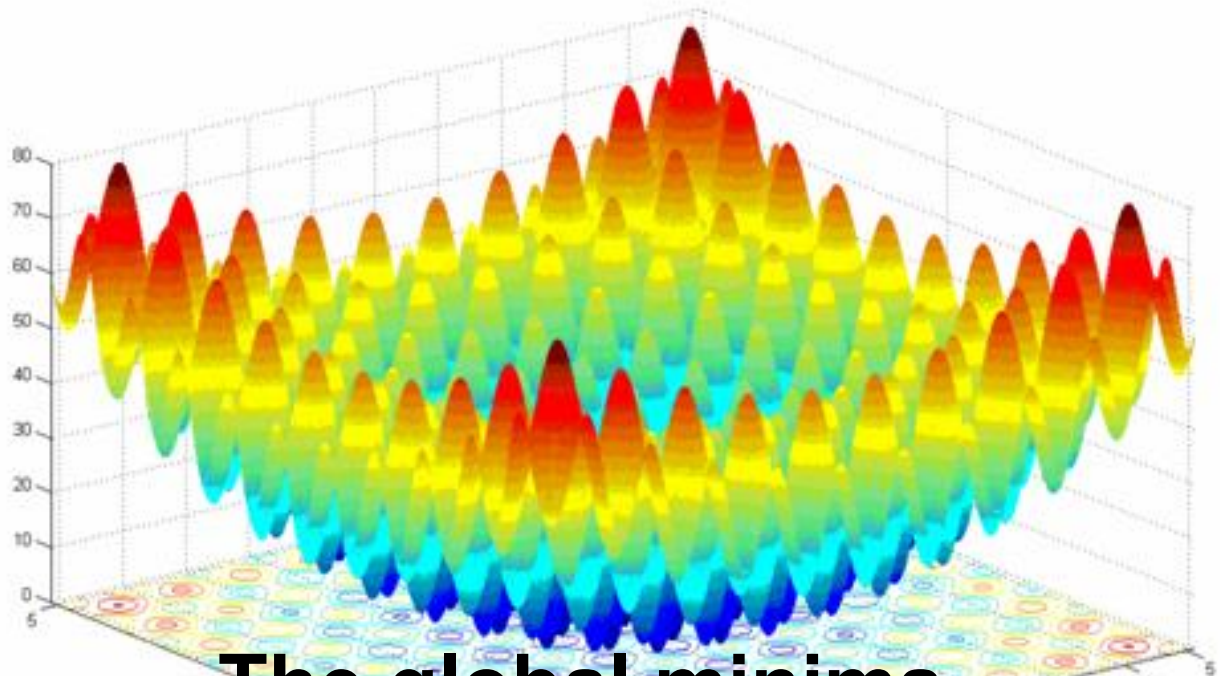
N=50

```
8.613576747062595e-46
1.3702344145659791e-42
3.0406036839489 63e-64
4.4617337356979086e-72
1.0872715714936083e-72
6.2826655769290024e-89
1.1364183475328357e-63
9.0720052299575 09e-153
6.8046308080154 72e-68
5.8700509371109 77e-29
"group_mean=5.8700509371111 13e-30"
3.1011748203849555e-58
```

N=100

	mean(μ)	Variance(σ^2)
20	0.4917	2.1763
50	7.68E-006	5.31E-010
100	5.87E-030	3.10E-058

RASTRIGIN FUNCTION



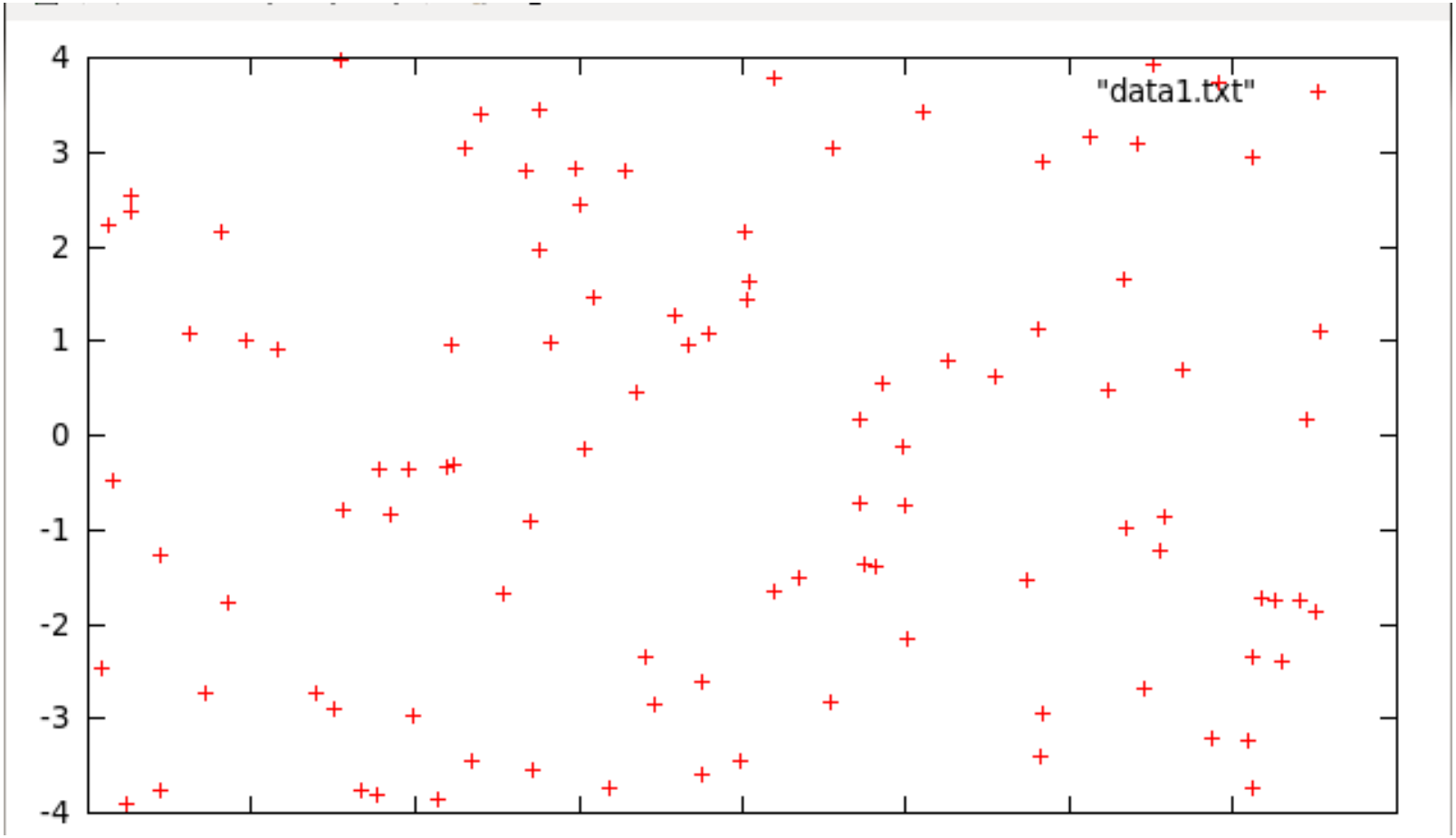
The global minima

$X^2 = (0, 0)$, $f(x^2) = 0$

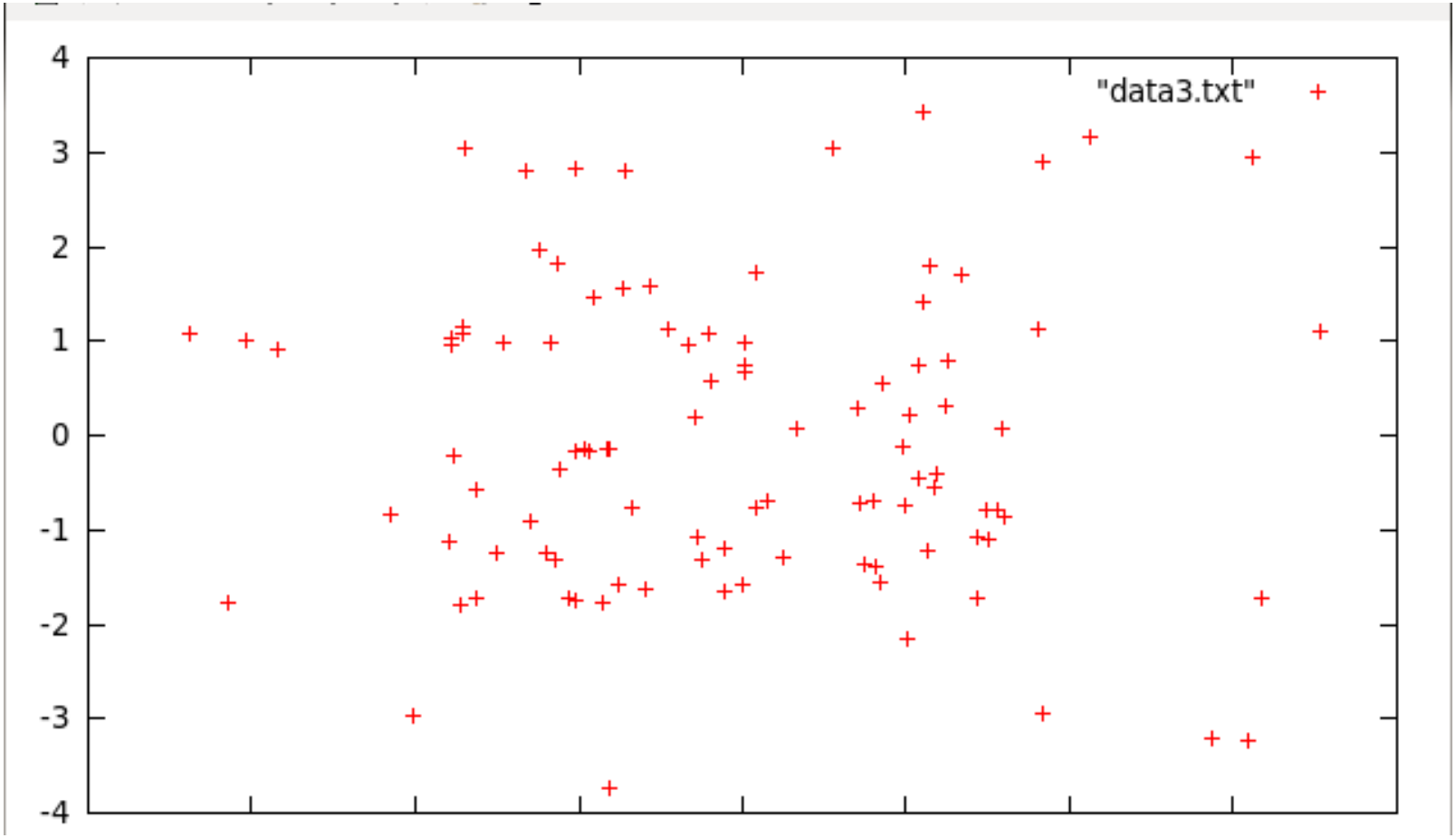
RASTRIGIN FUNCTION - PARAMETERS

- Particle number: 100
- Search domain: $-4 < X_i < 4$
- C_1: 2
- C_2: 2
- $Rand_1$: 0.28019110555769167
- $Rand_2$: 0.081576937926788
- V_0: [0, 0]
- W: 0
- Terminate condition: t = 100

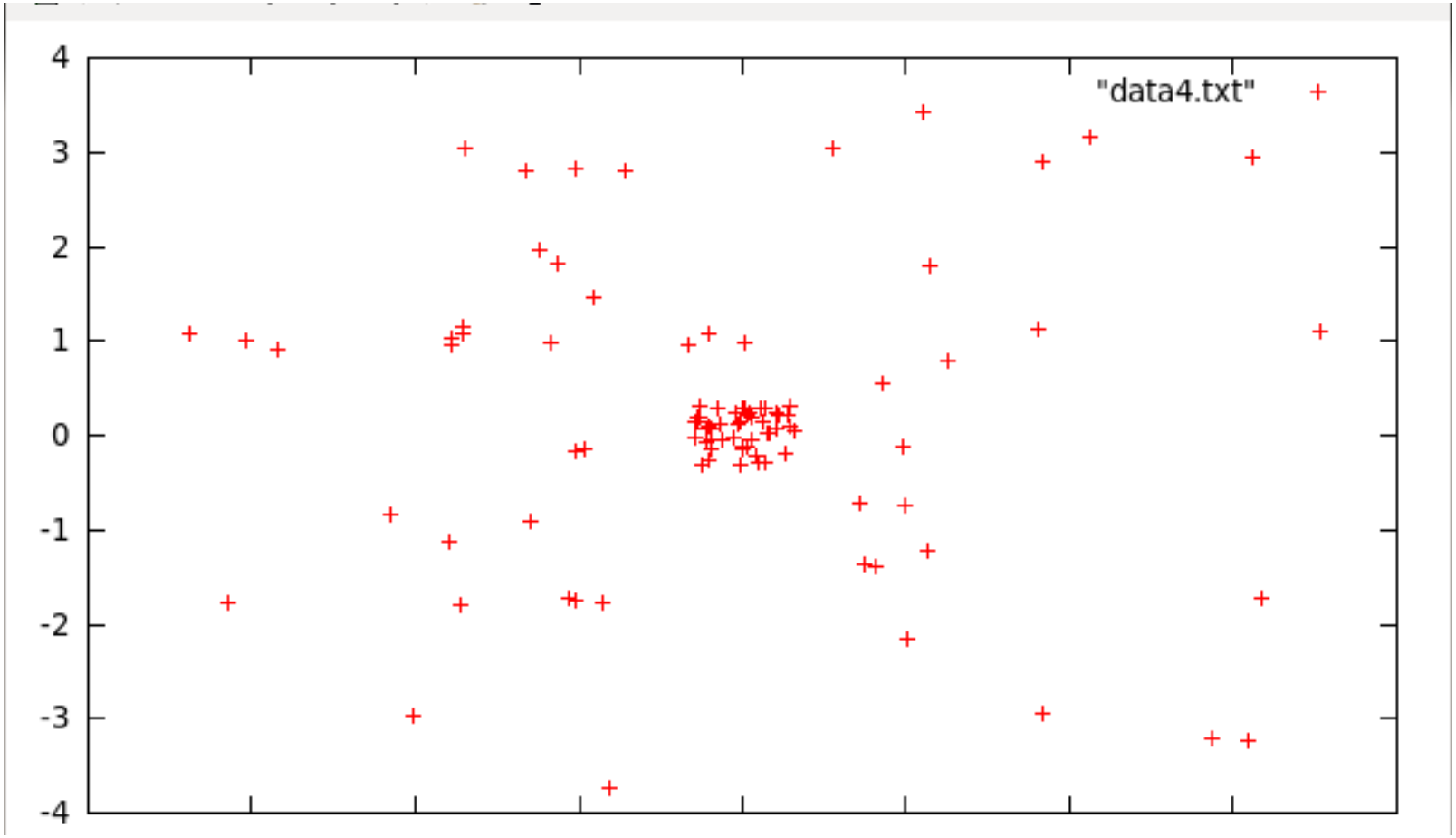
RASTRIGIN FUNCTION - PROCESS (1/7)



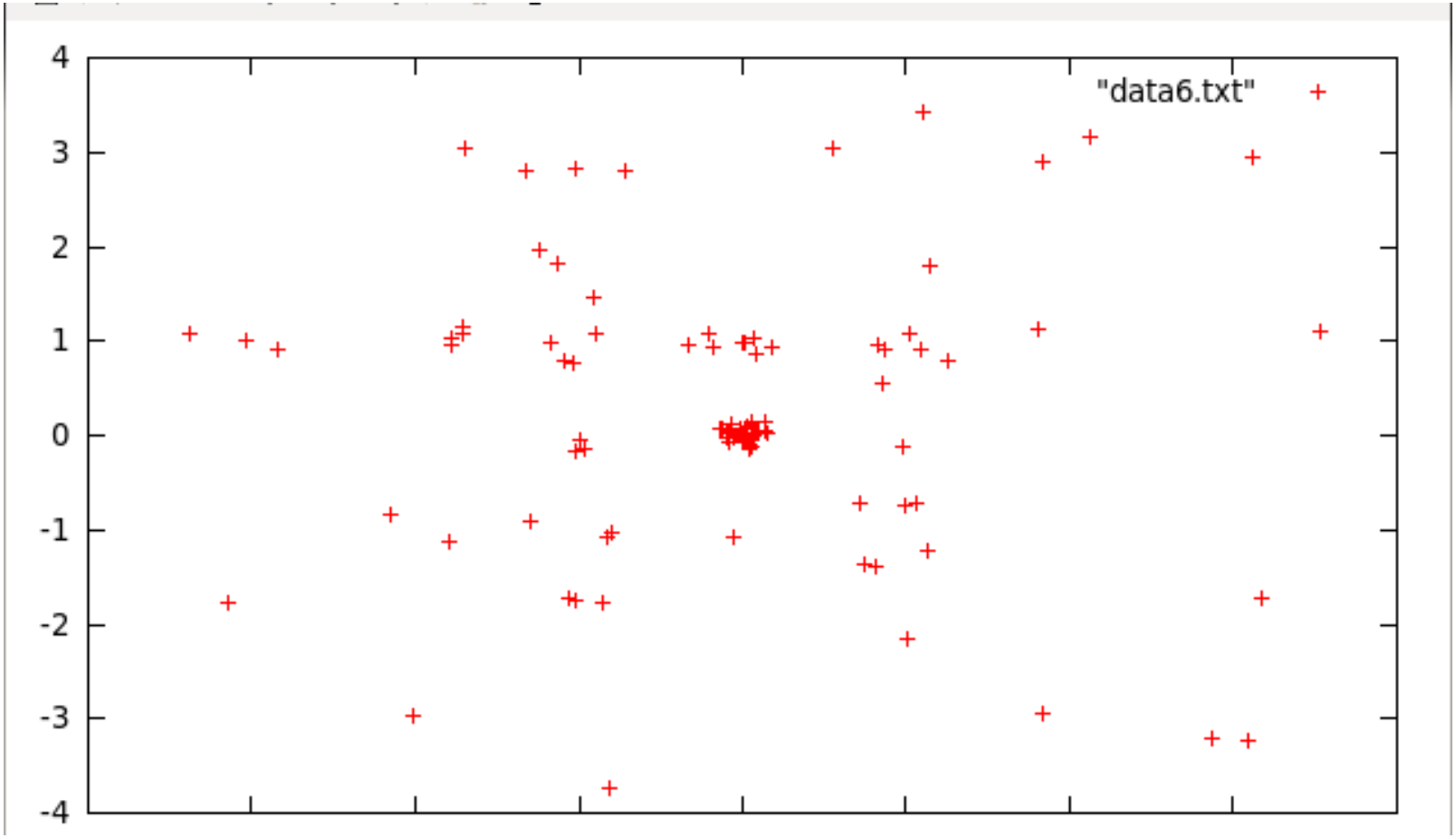
RASTRIGIN FUNCTION - PROCESS (2/7)



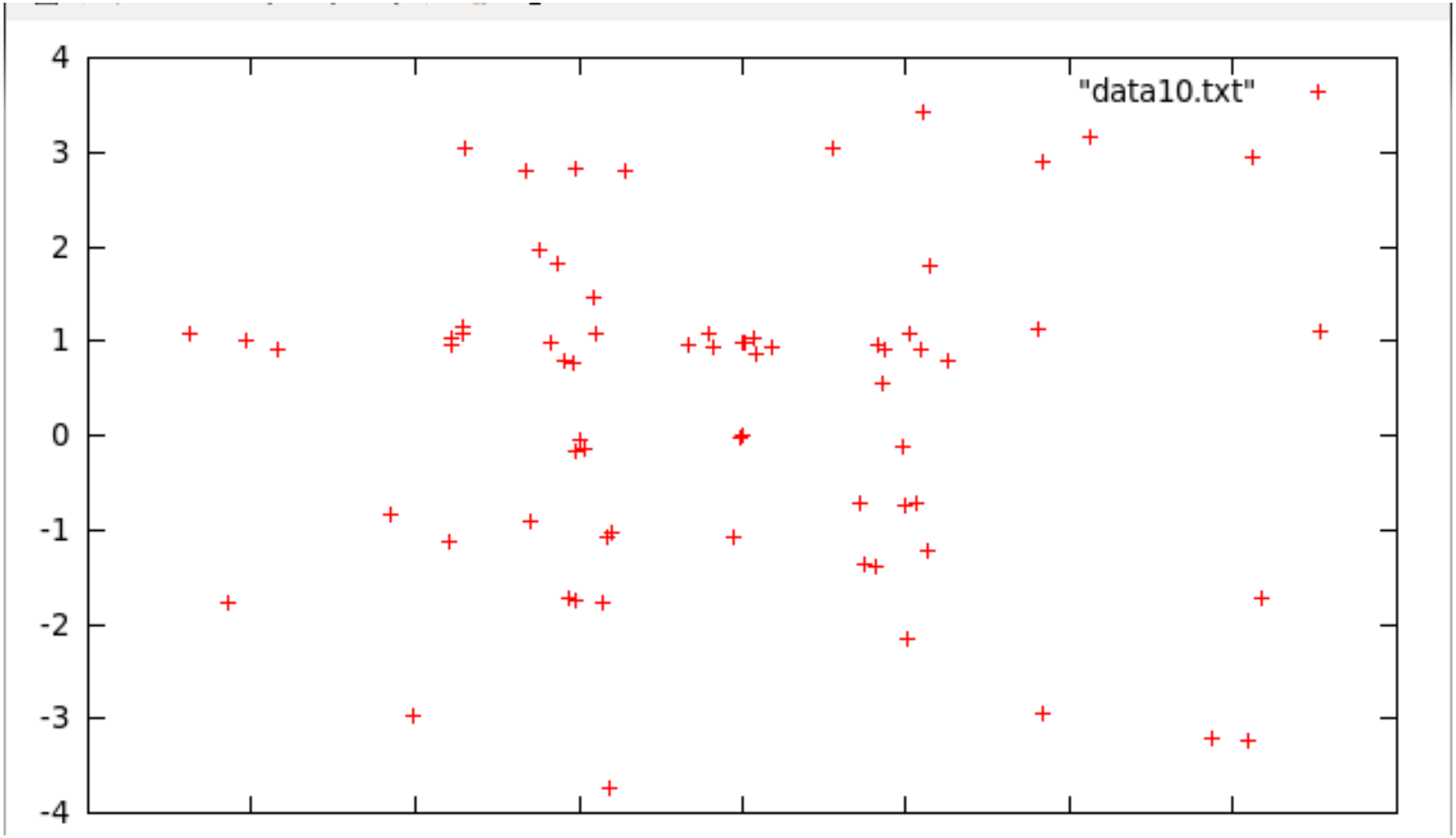
RASTRIGIN FUNCTION - PROCESS (3/7)



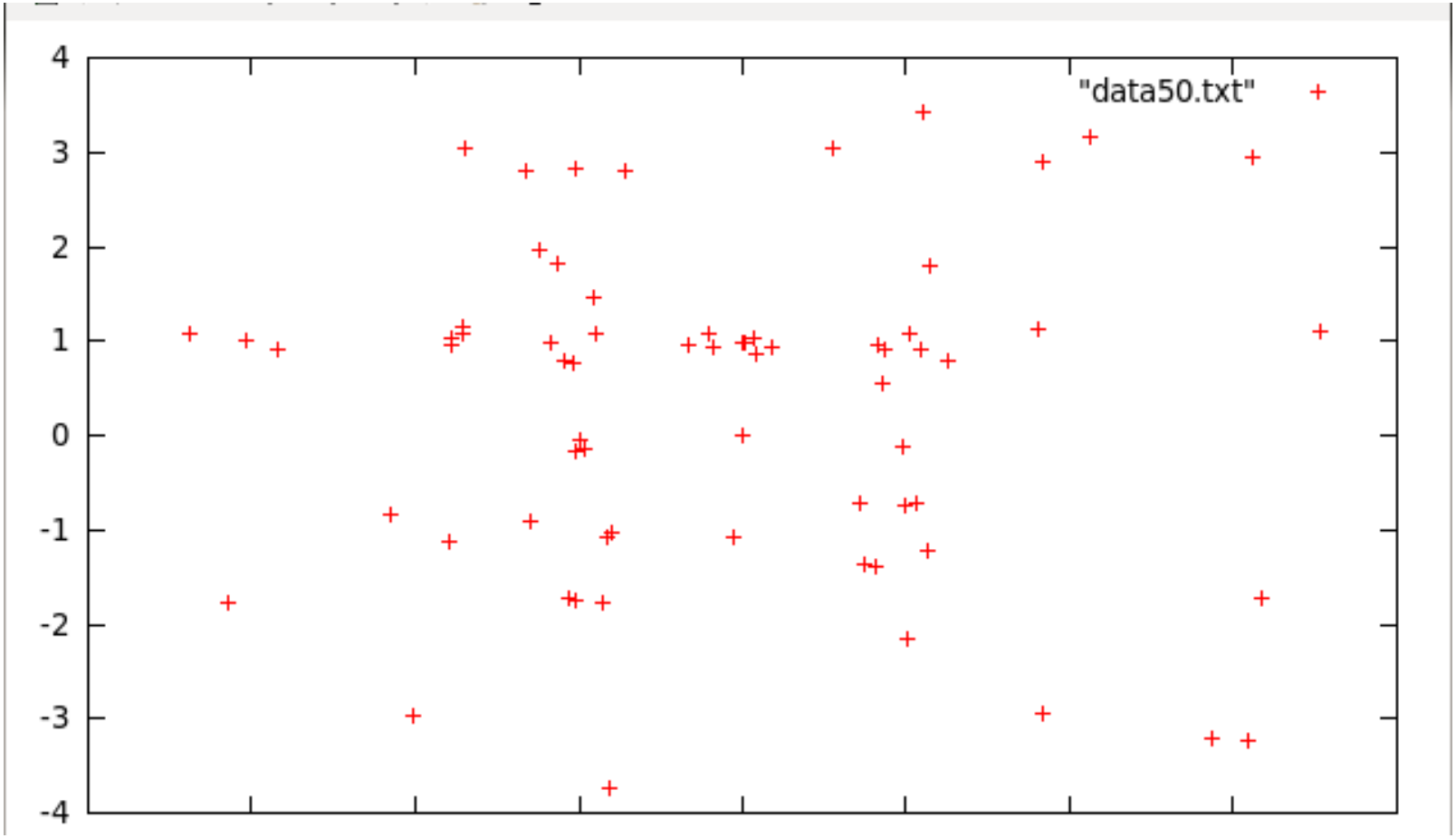
RASTRIGIN FUNCTION - PROCESS (4/7)



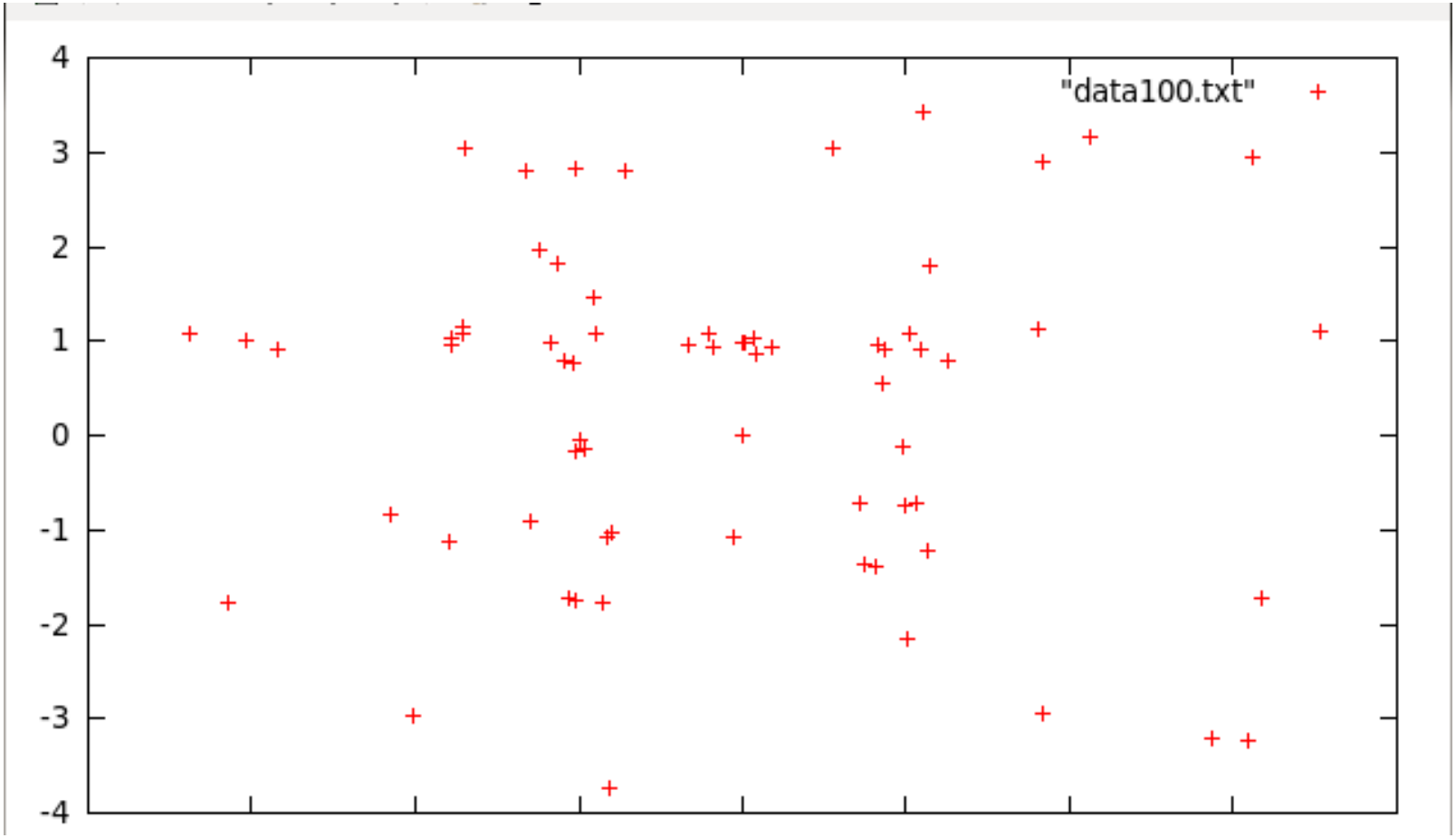
RASTRIGIN FUNCTION - PROCESS (5/7)



RASTRIGIN FUNCTION - PROCESS (6/7)



RASTRIGIN FUNCTION - PROCESS (7/7)



RASTRIGIN FUNCTION - STATISTICS

```
6.3
14.29651966249123
17.271967072653535
8.910844737388624
13.856759157322037
8.93230912825138
9.347810644514812
7.352708347696721
7.497496852421027
11.987121794800395
"group_mean=10.575353739753975"
11.656676031749509
```

N=20

```
10.822973288447372
9.297022958221831
12.487442373478448
13.236299513493949
10.142652286138976
7.289409059966059
7.402526919013359
11.27975617272709
10.27636707034976
10.876263478574327
"group_mean=10.311071312041118"
3.3461323873907487
```

N=50

```
9.32933665500943
10.65369474517775
11.483220506438188
9.898241488091491
8.907033546363511
9.986374557222831
11.833319985814684
10.806480075627201
11.742359304145102
9.507448228126407
"group_mean=10.41475090920166"
0.9851877637769132
```

N=100

	mean(μ)	Variance(σ^2)
20	10.5754	11.6567
50	10.3111	3.3461
100	10.4147	0.9851

THANK YOU!

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