

For the jupyter notebook we use this octave kernel: https://github.com/Calysto/octave_kernel

```
pip install octave_kernel
cd <root of the project>
jupyter notebook
```

In [4]: format longE

```
# setup the path to include the 'utils' directory
directory = pwd
addpath(genpath(directory))
```

```
directory = /home/thodkatz/repos/personal/math-optimization
```

In []: *# define rosenbrock functions*

```
function f = rosen_sym()
    syms x y
    f = 100*(y-x^2)^2 + (1-x)^2;
end

function val = rosen(v)
    [sym_var, sym_point] = point2sym(rosen_sym, v);
    val = eval(subs(rosen_sym, sym_var, sym_point));
end

function val = rosen_grad(point)
    assert(is_vector(point))
    val = multidim_grad(rosen_sym, point);
end

function val = rosen_hessian(v)
    # Given a vector 'v' with 2 coordinates return the hessian of the Rosenbrock func
    val = multidim_hessian(rosen_sym, v);
end
```

In []: is_wolfe_weak = 1;
is_wolfe_strong = 2;
is_armijo = 3;
is_none = 4;

In [7]: [xmin, ymin] = newton(@rosen, @rosen_grad, @rosen_hessian, [1.2,1.2]', is_wolfe_weak)

STARTED Linesearch using newton
Symbolic pkg v3.1.1: Python communication link active, SymPy v1.11.1.

STARTED WOLFE Step size config...
ENDED WOLFE Step size config...

Iter 1, x=[1.195918,1.430204], a=1.000000

STARTED WOLFE Step size config...
Iter 0, step size: 0.5
ENDED WOLFE Step size config...

Iter 2, x=[1.098284,1.196688], a=0.500000

STARTED WOLFE Step size config...
ENDED WOLFE Step size config...

Iter 3, x=[1.064488,1.131993], a=1.000000

STARTED WOLFE Step size config...
ENDED WOLFE Step size config...

Iter 4, x=[1.011992,1.021372], a=1.000000

STARTED WOLFE Step size config...
ENDED WOLFE Step size config...

Iter 5, x=[1.004261,1.008481], a=1.000000

STARTED WOLFE Step size config...
ENDED WOLFE Step size config...

Iter 6, x=[1.000050,1.000083], a=1.000000

STARTED WOLFE Step size config...
ENDED WOLFE Step size config...

Iter 7, x=[1.000000,1.000000], a=1.000000

STARTED WOLFE Step size config...
ENDED WOLFE Step size config...

Iter 8, x=[1.000000,1.000000], a=1.000000
ENDED Line search using newton
xmin =

1.000000000000000089e+00
1.000000000000000147e+00

ymin = 1.074235775027810e-25

In [5]: [xmin, ymin] = newton(@rosen, @rosen_grad, @rosen_hessian, [1.2,1.2]', is_armijo)

```
STARTED Line search using newton
Symbolic pkg v3.1.1: Python communication link active, SymPy v1.11.1.
```

```
STARTED ARMIJO Step size config...
ENDED ARMIJO Step size config...
```

```
Iter 1, x=[1.195918,1.430204], a=1.000000
```

```
STARTED ARMIJO Step size config...
Iter 0, step size: 0.5
ENDED ARMIJO Step size config...
```

```
Iter 2, x=[1.098284,1.196688], a=0.500000
```

```
STARTED ARMIJO Step size config...
ENDED ARMIJO Step size config...
```

```
Iter 3, x=[1.064488,1.131993], a=1.000000
```

```
STARTED ARMIJO Step size config...
ENDED ARMIJO Step size config...
```

```
Iter 4, x=[1.011992,1.021372], a=1.000000
```

```
STARTED ARMIJO Step size config...
ENDED ARMIJO Step size config...
```

```
Iter 5, x=[1.004261,1.008481], a=1.000000
```

```
STARTED ARMIJO Step size config...
ENDED ARMIJO Step size config...
```

```
Iter 6, x=[1.000050,1.000083], a=1.000000
```

```
STARTED ARMIJO Step size config...
ENDED ARMIJO Step size config...
```

```
Iter 7, x=[1.000000,1.000000], a=1.000000
```

```
STARTED ARMIJO Step size config...
ENDED ARMIJO Step size config...
```

```
Iter 8, x=[1.000000,1.000000], a=1.000000
ENDED Line search using newton
xmin =
```

```
1.000000000000000089e+00
1.000000000000000147e+00
```

```
ymin = 1.074235775027810e-25
```

```
In [6]: [xmin, ymin] = newton(@rosen, @rosen_grad, @rosen_hessian, [1.2,1.2]', is_none)
```

```
STARTED Line search using newton
Iter 1, x=[1.195918,1.430204], a=1.000000
Iter 2, x=[1.000651,0.963172], a=1.000000
Iter 3, x=[1.000575,1.001151], a=1.000000
Iter 4, x=[1.000000,1.000000], a=1.000000
Iter 5, x=[1.000000,1.000000], a=1.000000
ENDED Line search using newton
xmin =
```

```
1.000000000000000043e+00
1.000000000000000087e+00
```

```
ymin= 1.874777245064311e-27
```

```
In [11]: [xmin, ymin] = newton(@rosen, @rosen_grad, @rosen_hessian, [-1.2,1]', is_none)
```

```
STARTED Line search using newton
Iter 1, x=[-1.175281,1.380674], a=1.000000
Iter 2, x=[0.763115,-3.175034], a=1.000000
Iter 3, x=[0.763430,0.582825], a=1.000000
Iter 4, x=[0.999995,0.944027], a=1.000000
Iter 5, x=[0.999996,0.999991], a=1.000000
Iter 6, x=[1.000000,1.000000], a=1.000000
ENDED Line search using newton
xmin =
```

```
9.999999999999999e-01
9.99999999814724e-01
```

```
ymin = 3.432646187536322e-20
```

```
In [ ]: [xmin, ymin] = steepest_descent(@rosen, @rosen_grad, [1.2,1.2]', is_wolfe_weak)
```

```
In [10]: [xmin, ymin] = steepest_descent(@rosen, @rosen_grad, [-1.2,1]', is_armijo)
```

STARTED Line search using steepest descent

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

Iter 9, step size: 0.000976562

Maximum number of iterations

ENDED ARMIJO Step size config...

Iter 1, $x = [-0.989453, 1.085938]$, $a = 0.000977$

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

Iter 9, step size: 0.000976562

Maximum number of iterations

ENDED ARMIJO Step size config...

Iter 2, $x = [-1.026893, 1.065055]$, $a = 0.000977$

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

ENDED ARMIJO Step size config...

Iter 3, $x = [-1.027979, 1.056815]$, $a = 0.003906$

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

ENDED ARMIJO Step size config...

Iter 4, $x = [0.984742, 1.049394]$, $a = 0.500000$

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

Iter 9, step size: 0.000976562

Maximum number of iterations

ENDED ARMIJO Step size config...

Iter 5, x=[1.015421,1.033832], a=0.000977

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

Iter 9, step size: 0.000976562

Maximum number of iterations

ENDED ARMIJO Step size config...

Iter 6, x=[1.016483,1.033294], a=0.000977

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

ENDED ARMIJO Step size config...

Iter 7, x=[1.016186,1.032934], a=0.031250

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

Iter 9, step size: 0.000976562

Maximum number of iterations

ENDED ARMIJO Step size config...

Iter 8, x=[1.016273,1.032875], a=0.000977

STARTED ARMIJO Step size config...

ENDED ARMIJO Step size config...

Iter 9, x=[1.009590,1.020150], a=1.000000

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

Iter 9, step size: 0.000976562

Maximum number of iterations

ENDED ARMIJO Step size config...

Iter 10, x=[1.009918,1.019979], a=0.000977

STARTED ARMIJO Step size config...
Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
ENDED ARMIJO Step size config...

Iter 11, x=[1.009892,1.019838], a=0.015625

STARTED ARMIJO Step size config...
Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
Iter 9, step size: 0.000976562
Maximum number of iterations
ENDED ARMIJO Step size config...

Iter 12, x=[1.009855,1.019847], a=0.000977

STARTED ARMIJO Step size config...
ENDED ARMIJO Step size config...

Iter 13, x=[1.005766,1.012112], a=1.000000

STARTED ARMIJO Step size config...
Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
Iter 9, step size: 0.000976562
Maximum number of iterations
ENDED ARMIJO Step size config...

Iter 14, x=[1.005970,1.012005], a=0.000977

STARTED ARMIJO Step size config...
Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
ENDED ARMIJO Step size config...

Iter 15, x=[1.005971,1.011982], a=0.003906

STARTED ARMIJO Step size config...
Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625

Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 16, x=[1.005951,1.011980], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 17, x=[1.005961,1.011963], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 18, x=[1.005942,1.011961], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 19, x=[1.005952,1.011945], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 20, x=[1.005933,1.011943], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 21, x=[1.005942,1.011926], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 22, x=[1.005924,1.011924], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 23, x=[1.005933,1.011908], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 24, x=[1.005915,1.011905], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 25, x=[1.005923,1.011890], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 26, x=[1.005907,1.011887], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 27, x=[1.005914,1.011872], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 28, x=[1.005898,1.011868], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 29, x=[1.005904,1.011853], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 30, x=[1.005889,1.011850], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 31, x=[1.005895,1.011835], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 32, x=[1.005880,1.011831], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 33, x=[1.005886,1.011817], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 34, x=[1.005871,1.011813], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25

Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 35, x=[1.005876,1.011799], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 36, x=[1.005862,1.011794], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 37, x=[1.005867,1.011781], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 38, x=[1.005854,1.011776], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 39, x=[1.005858,1.011762], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 40, x=[1.005845,1.011757], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

ENDED ARMIJO Step size config...

Iter 41, x=[1.005852,1.011731], a=0.003906

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 42, x=[1.005823,1.011734], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 43, x=[1.005842,1.011713], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 44, x=[1.005815,1.011716], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 45, x=[1.005833,1.011695], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 46, x=[1.005807,1.011697], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 47, x=[1.005823,1.011678], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 48, x=[1.005798,1.011679], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 49, x=[1.005814,1.011660], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 50, x=[1.005790,1.011660], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 51, x=[1.005804,1.011642], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 52, x=[1.005781,1.011642], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 53, x=[1.005795,1.011624], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 54, x=[1.005773,1.011624], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 55, x=[1.005786,1.011606], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 56, x=[1.005764,1.011606], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 57, x=[1.005776,1.011588], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 58, x=[1.005756,1.011587], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 59, x=[1.005767,1.011571], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 60, x=[1.005747,1.011569], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 61, x=[1.005758,1.011553], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 62, x=[1.005739,1.011551], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 63, x=[1.005748,1.011535], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 64, x=[1.005730,1.011533], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 65, x=[1.005739,1.011518], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 66, x=[1.005722,1.011515], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 67, x=[1.005730,1.011500], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125

Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 68, x=[1.005713,1.011497], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 69, x=[1.005721,1.011482], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 70, x=[1.005705,1.011479], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 71, x=[1.005712,1.011465], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 72, x=[1.005696,1.011461], a=0.001953

STARTED ARMIJO Step size config...
Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 73, x=[1.005703,1.011447], a=0.001953

STARTED ARMIJO Step size config...
Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 74, x=[1.005688,1.011443], a=0.001953

STARTED ARMIJO Step size config...
Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 75, x=[1.005693,1.011429], a=0.001953

STARTED ARMIJO Step size config...
Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 76, x=[1.005679,1.011425], a=0.001953

STARTED ARMIJO Step size config...
Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 77, x=[1.005684,1.011412], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 78, x=[1.005671,1.011408], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 79, x=[1.005675,1.011394], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 80, x=[1.005662,1.011390], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 81, x=[1.005666,1.011377], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 82, x=[1.005653,1.011372], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 83, x=[1.005657,1.011359], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 84, x=[1.005645,1.011354], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
ENDED ARMIJO Step size config...

Iter 85, x=[1.005652,1.011329], a=0.003906

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 86, x=[1.005624,1.011332], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25

Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 87, x=[1.005643,1.011312], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 88, x=[1.005616,1.011314], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 89, x=[1.005633,1.011294], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 90, x=[1.005608,1.011296], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 91, x=[1.005624,1.011277], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 92, x=[1.005600,1.011278], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 93, x=[1.005615,1.011260], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 94, x=[1.005592,1.011260], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625

Iter 8, step size: 0.00195312

ENDED ARMIJO Step size config...

Iter 95, x=[1.005606,1.011243], a=0.001953

STARTED ARMIJO Step size config...

Iter 0, step size: 0.5

Iter 1, step size: 0.25

Iter 2, step size: 0.125

Iter 3, step size: 0.0625

Iter 4, step size: 0.03125

Iter 5, step size: 0.015625

Iter 6, step size: 0.0078125

Iter 7, step size: 0.00390625


```
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 96, x=[1.005584,1.011243], a=0.001953

STARTED ARMIJO Step size config...
Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 97, x=[1.005597,1.011225], a=0.001953

STARTED ARMIJO Step size config...
Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 98, x=[1.005575,1.011225], a=0.001953

STARTED ARMIJO Step size config...
Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 99, x=[1.005588,1.011208], a=0.001953

STARTED ARMIJO Step size config...
Iter 0, step size: 0.5
Iter 1, step size: 0.25
Iter 2, step size: 0.125
Iter 3, step size: 0.0625
Iter 4, step size: 0.03125
Iter 5, step size: 0.015625
Iter 6, step size: 0.0078125
Iter 7, step size: 0.00390625
Iter 8, step size: 0.00195312
ENDED ARMIJO Step size config...

Iter 100, x=[1.005567,1.011208], a=0.001953
ENDED Line search using steepest descent
xmin =

    1.005567246468059e+00
    1.011207521826797e+00
```

```
ymin = 3.117092447874594e-05
```

```
In [ ]: [xmin, ymin] = steepest_descent(@rosen, @rosen_grad, [-1.2,1]', is_none)
```