

```
nonlinearmin_test(1, 0)
```

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-----  
Minimizing quadratic, min at origin  
Executing minimization of function @(x)x'*H*x  
Starting at point [1, 2],  
Using DFP method.
```

outer it.	iteration	x	step size	f(x)	norm(grad)	ls	iters
lambda							
init		+1.00e+00 +2.00e+00		2.30e+01			
1	1	+3.80e-01 -6.83e-02	2.16e+00	4.55e-01	2.09e+01	3	
1.03e-01							
	2	+7.12e-10 +2.37e-09	3.86e-01	2.97e-17	2.38e+00	3	
1.63e-01							
2	1	+7.12e-10 +2.37e-09	0.00e+00	2.97e-17	2.41e-08	1	
0.00e+00							

```
x =
```

```
1.0e-08 *  
  
0.0712  
0.2372
```

```
no_its =
```

```
4
```

```
normg =
```

```
2.4101e-08
```

```
Executing minimization of function @(x)x'*H*x  
Starting at point [1, 2],  
Using BFGS method.
```

outer it.	iteration	x	step size	f(x)	norm(grad)	ls	iters
lambda							
init		+1.00e+00 +2.00e+00		2.30e+01			
1	1	+3.80e-01 -6.83e-02	2.16e+00	4.55e-01	2.09e+01	3	
1.03e-01							
	2	+7.12e-10 +2.37e-09	3.86e-01	2.96e-17	2.38e+00	3	
1.61e-01							

```

      2      1      +7.12e-10      0.00e+00      2.96e-17      2.41e-08      1
0.00e+00
      +2.37e-09

```

x =

```

1.0e-08 *
0.0712
0.2372

```

no_its =

4

normg =

2.4100e-08

```

-----
-----
Minimizing quadratic, min at origin
Executing minimization of function @(x)x'*H*x
Starting at point [-5, -3],
Using DFP method.

```

outer it.	iteration	x	step size	f(x)	norm(grad)	ls	iters
lambda							
init		-5.00e+00 -3.00e+00		1.20e+02			
1	1	-1.25e+00 +7.50e-01	5.30e+00	7.50e+00	4.24e+01	3	
1.25e-01							
	2	+1.96e-08 +1.96e-08	1.46e+00	3.06e-15	1.06e+01	3	
1.42e-01							
2	1	+1.96e-08 +1.96e-08	0.00e+00	3.06e-15	2.28e-07	1	
0.00e+00							

x =

```

1.0e-07 *
0.1957
0.1957

```

no_its =

4

normg =

2.2820e-07

Executing minimization of function @(x)x'*H*x

Starting at point [-5, -3],

Using BFGS method.

outer it.	iteration	x	step size	f(x)	norm(grad)	ls	iters
lambda							
init		-5.00e+00 -3.00e+00		1.20e+02			
1	1	-1.25e+00 +7.50e-01	5.30e+00	7.50e+00	4.24e+01		3
1.25e-01							
	2	+1.96e-08 +1.96e-08	1.46e+00	3.08e-15	1.06e+01		3
1.33e-01							
2	1	+1.96e-08 +1.96e-08	0.00e+00	3.08e-15	2.29e-07		1
0.00e+00							

x =

1.0e-07 *

0.1961
0.1961

no_its =

4

normg =

2.2874e-07

Minimizing quadratic, min at origin

Executing minimization of function @(x)x'*H*x

Starting at point [1, 2],

Using DFP method.

outer it.	iteration	x	step size	f(x)	norm(grad)	ls	iters
lambda							
init		+1.00e+00 +2.00e+00		1.00e+06			
1	1	-3.94e-11	1.00e+00	1.20e+01	2.00e+06		3
5.00e-07							

			+2.00e+00			
1.67e-01	2	+2.42e-09	2.00e+00	5.84e-12	1.20e+01	3
		+9.89e-13				
2	1	+2.42e-09	0.00e+00	5.84e-12	4.83e-03	1
0.00e+00		+9.89e-13				

```

x =
    1.0e-08 *
    0.2417
    0.0001

```

```

no_its =
    4

```

```

normg =
    0.0048

```

Executing minimization of function @(x)x'*H*x
 Starting at point [1, 2],
 Using BFGS method.

outer it.	iteration	x	step size	f(x)	norm(grad)	ls iters
lambda						
init		+1.00e+00		1.00e+06		
		+2.00e+00				
1	1	-3.94e-11	1.00e+00	1.20e+01	2.00e+06	3
5.00e-07		+2.00e+00				
	2	+2.42e-09	2.00e+00	5.84e-12	1.20e+01	3
1.67e-01		+9.90e-13				
2	1	+2.42e-09	0.00e+00	5.84e-12	4.83e-03	1
0.00e+00		+9.90e-13				

```

x =
    1.0e-08 *
    0.2417
    0.0001

```

```

no_its =

```

4

normg =

0.0048

 Minimizing quadratic, min at origin
 Executing minimization of function @(x)x'*H*x
 Starting at point [7, 7, 7, 7, 7],
 Using DFP method.

outer it.	iteration	x	step size	f(x)	norm(grad)	ls	iters
lambda							
init		+7.00e+00 +7.00e+00		1.22e+03			
1 6.73e-02	1	+6.06e+00 +4.17e+00 +2.29e+00 +4.00e-01 -1.49e+00	1.21e+01	1.36e+02	1.80e+02	3	
1.05e-01	2	+4.77e+00 +1.44e+00 -4.09e-01 -7.64e-01 +3.70e-01	4.60e+00	3.51e+01	4.52e+01	3	
1.53e-01	3	+3.25e+00 -2.87e-01 -4.70e-01 +3.72e-01 -8.84e-02	2.61e+00	1.29e+01	1.85e+01	3	
2.41e-01	4	+1.47e+00 -6.55e-01 +3.54e-01 -1.20e-01 +1.82e-02	2.05e+00	4.20e+00	9.84e+00	3	
3.27e-01	5	-3.43e-08 -8.64e-08 -1.08e-07 -9.85e-08 -6.44e-08	1.66e+00	1.88e-13	6.30e+00	3	
2 0.00e+00	1	-3.43e-08 -8.64e-08 -1.08e-07	0.00e+00	1.88e-13	2.17e-06	1	

-9.85e-08
-6.44e-08

x =

1.0e-06 *

-0.0343
-0.0864
-0.1084
-0.0985
-0.0644

no_its =

10

normg =

2.1664e-06

Executing minimization of function @(x)x'*H*x
Starting at point [7, 7, 7, 7, 7],
Using BFGS method.

outer it.	iteration	x	step size	f(x)	norm(grad)	ls	iters
lambda							
init		+7.00e+00 +7.00e+00		1.22e+03			
1	1	+6.06e+00	1.21e+01	1.36e+02	1.80e+02	3	
6.73e-02		+4.17e+00 +2.29e+00 +4.00e-01 -1.49e+00					
	2	+4.77e+00	4.60e+00	3.51e+01	4.52e+01	3	
9.88e-02		+1.44e+00 -4.09e-01 -7.64e-01 +3.70e-01					
	3	+3.25e+00	2.61e+00	1.29e+01	1.85e+01	3	
1.30e-01		-2.87e-01 -4.70e-01 +3.72e-01 -8.84e-02					
	4	+1.47e+00	2.05e+00	4.20e+00	9.84e+00	3	
1.80e-01		-6.55e-01 +3.54e-01 -1.20e-01					

			+1.82e-02			
2.12e-01	5	-5.77e-08	1.66e+00	1.64e-13	6.30e+00	3
		-8.98e-08				
		-7.88e-08				
		-7.36e-08				
		-8.63e-08				
2	1	-5.77e-08	0.00e+00	1.64e-13	2.10e-06	1
0.00e+00		-8.98e-08				
		-7.88e-08				
		-7.36e-08				
		-8.63e-08				

x =

1.0e-07 *

-0.5768
-0.8985
-0.7882
-0.7361
-0.8634

no_its =

10

normg =

2.0982e-06

Minimizing negative definite quadratic form, has no minimum
Executing minimization of function @(x)x'*H*x
Starting at point [5, 9],
Using DFP method.

outer it.	iteration	x	step size	f(x)	norm(grad)	ls	iters
lambda							
init		+5.00e+00		-1.06e+02			
		+9.00e+00					

[#Warning: The function does not seem to be convex: cannot be minimized.]#
[#> In testQuadratics', '/Users/simondanielsson/Documents/F/F4/optimering/project/v1.1/nonlinearmin_test.m', 101)" style="font-weight:bold">nonlinearmin_test>testQuadratics (line 101)
In <a

```
href="matlab:matlab.internal.language.introspective.errorDocCallback('nonlinearmin_
test>testNegDef',
'/Users/simondanielsson/Documents/F/F4/optimering/project/v1.1/nonlinearmin_test.m'
, 73)" style="font-weight:bold">nonlinearmin_test>testNegDef</a> (<a href="matlab:
opentoline('/Users/simondanielsson/Documents/F/F4/optimering/project/v1.1/
nonlinearmin_test.m',73,0)">line 73</a>)
```

```
In <a
href="matlab:matlab.internal.language.introspective.errorDocCallback('nonlinearmin_
test',
'/Users/simondanielsson/Documents/F/F4/optimering/project/v1.1/nonlinearmin_test.m'
, 7)" style="font-weight:bold">nonlinearmin_test</a> (<a href="matlab:
opentoline('/Users/simondanielsson/Documents/F/F4/optimering/project/v1.1/
nonlinearmin_test.m',7,0)">line 7</a>)]#
Executing minimization of function @(x)x'*H*x
Starting at point [5, 9],
Using BFGS method.
```

outer it.	iteration	x	step size	f(x)	norm(grad)	ls	iters
lambda							
	init	+5.00e+00		-1.06e+02			
		+9.00e+00					

```
[#Warning: The function does not seem to be convex: cannot be minimized.]#
[#> In <a
href="matlab:matlab.internal.language.introspective.errorDocCallback('nonlinearmin_
test>testQuadratics',
'/Users/simondanielsson/Documents/F/F4/optimering/project/v1.1/nonlinearmin_test.m'
, 101)" style="font-weight:bold">nonlinearmin_test>testQuadratics</a> (<a
href="matlab:
opentoline('/Users/simondanielsson/Documents/F/F4/optimering/project/v1.1/
nonlinearmin_test.m',101,0)">line 101</a>)
```

```
In <a
href="matlab:matlab.internal.language.introspective.errorDocCallback('nonlinearmin_
test>testNegDef',
'/Users/simondanielsson/Documents/F/F4/optimering/project/v1.1/nonlinearmin_test.m'
, 73)" style="font-weight:bold">nonlinearmin_test>testNegDef</a> (<a href="matlab:
opentoline('/Users/simondanielsson/Documents/F/F4/optimering/project/v1.1/
nonlinearmin_test.m',73,0)">line 73</a>)
```

```
In <a
href="matlab:matlab.internal.language.introspective.errorDocCallback('nonlinearmin_
test',
'/Users/simondanielsson/Documents/F/F4/optimering/project/v1.1/nonlinearmin_test.m'
, 7)" style="font-weight:bold">nonlinearmin_test</a> (<a href="matlab:
opentoline('/Users/simondanielsson/Documents/F/F4/optimering/project/v1.1/
nonlinearmin_test.m',7,0)">line 7</a>)]#
```

```
-----
-----
Minimizing indefinite quadratic form, has no minimum
Executing minimization of function @(x)x'*H*x
Starting at point [5, 9],
Using DFP method.
```

outer it.	iteration	x	step size	f(x)	norm(grad)	ls	iters
lambda							
	init	+5.00e+00		3.30e+02			
		+9.00e+00					
1	1	+8.57e+00	1.13e+01	-2.06e+02	9.49e+01	3	
1.19e-01							

-1.71e+00

```
[#Warning: The function does not seem to be convex: cannot be minimized.]#
[#> In <a
href="matlab:matlab.internal.language.introspective.errorDocCallback('nonlinearmin_
test>testQuadratics',
'/Users/simondanielsson/Documents/F/F4/optimering/project/v1.1/nonlinearmin_test.m'
, 101)" style="font-weight:bold">nonlinearmin_test>testQuadratics</a> (<a
href="matlab:
opentoline('/Users/simondanielsson/Documents/F/F4/optimering/project/v1.1/
nonlinearmin_test.m',101,0)">line 101</a>)
In <a
href="matlab:matlab.internal.language.introspective.errorDocCallback('nonlinearmin_
test>testInDef',
'/Users/simondanielsson/Documents/F/F4/optimering/project/v1.1/nonlinearmin_test.m'
, 89)" style="font-weight:bold">nonlinearmin_test>testInDef</a> (<a href="matlab:
opentoline('/Users/simondanielsson/Documents/F/F4/optimering/project/v1.1/
nonlinearmin_test.m',89,0)">line 89</a>)
In <a
href="matlab:matlab.internal.language.introspective.errorDocCallback('nonlinearmin_
test',
'/Users/simondanielsson/Documents/F/F4/optimering/project/v1.1/nonlinearmin_test.m'
, 10)" style="font-weight:bold">nonlinearmin_test</a> (<a href="matlab:
opentoline('/Users/simondanielsson/Documents/F/F4/optimering/project/v1.1/
nonlinearmin_test.m',10,0)">line 10</a>)]#
Executing minimization of function @(x)x'*H*x
Starting at point [5, 9],
Using BFGS method.
```

outer it.	iteration	x	step size	f(x)	norm(grad)	ls	iters
lambda							
	init	+5.00e+00		3.30e+02			
		+9.00e+00					
1	1	+8.57e+00	1.13e+01	-2.06e+02	9.49e+01		3
1.19e-01		-1.71e+00					

```
[#Warning: The function does not seem to be convex: cannot be minimized.]#
[#> In <a
href="matlab:matlab.internal.language.introspective.errorDocCallback('nonlinearmin_
test>testQuadratics',
'/Users/simondanielsson/Documents/F/F4/optimering/project/v1.1/nonlinearmin_test.m'
, 101)" style="font-weight:bold">nonlinearmin_test>testQuadratics</a> (<a
href="matlab:
opentoline('/Users/simondanielsson/Documents/F/F4/optimering/project/v1.1/
nonlinearmin_test.m',101,0)">line 101</a>)
In <a
href="matlab:matlab.internal.language.introspective.errorDocCallback('nonlinearmin_
test>testInDef',
'/Users/simondanielsson/Documents/F/F4/optimering/project/v1.1/nonlinearmin_test.m'
, 89)" style="font-weight:bold">nonlinearmin_test>testInDef</a> (<a href="matlab:
opentoline('/Users/simondanielsson/Documents/F/F4/optimering/project/v1.1/
nonlinearmin_test.m',89,0)">line 89</a>)
In <a
href="matlab:matlab.internal.language.introspective.errorDocCallback('nonlinearmin_
test',
'/Users/simondanielsson/Documents/F/F4/optimering/project/v1.1/nonlinearmin_test.m'
, 10)" style="font-weight:bold">nonlinearmin_test</a> (<a href="matlab:
```

```
opentoline('/Users/simondanielsson/Documents/F/F4/optimering/project/v1.1/
nonlinearmin_test.m',10,0)">line 10</a>)]#
```

```
-----
Minimizing rosenbrock function, min at (1, 1)
Initial point [200, 200]
Executing minimization of function rosenbrock
Starting at point [200, 200],
Using DFP method.
```

outer it. lambda	iteration	x	step size	f(x)	norm(grad)	ls	iters
init		+2.00e+02 +2.00e+02		1.58e+11			
1 6.28e-08	1	-1.20e-03 +2.00e+02	2.00e+02	4.02e+06	3.18e+09		23
4.99e-03	2	-5.04e-01 +2.54e-01	2.00e+02	2.26e+00	4.01e+04		5
2 5.12e-03	1	-4.89e-01 +2.54e-01	1.54e-02	2.24e+00	3.00e+00		3
1.37e-01	2	-2.81e-01 +4.88e-02	2.92e-01	1.73e+00	3.05e+00		3
3 4.16e-03	1	-2.56e-01 +7.38e-02	3.52e-02	1.58e+00	8.46e+00		3
5.21e-02	2	-1.53e-01 +1.65e-02	1.18e-01	1.34e+00	2.34e+00		7
4 1.01e-02	1	-1.26e-01 +3.06e-02	3.09e-02	1.29e+00	3.07e+00		3
4.54e-02	2	-2.73e-02 +2.80e-03	1.02e-01	1.06e+00	3.31e+00		7
5 1.72e-02	1	+7.66e-03 -4.26e-03	3.57e-02	9.87e-01	2.07e+00		6
3.71e-02	2	+8.96e-02 -2.18e-03	8.20e-02	8.39e-01	2.15e+00		7
6 2.02e-02	1	+1.19e-01 +3.91e-02	5.07e-02	8.38e-01	2.51e+00		2

6.89e-02	2	+2.43e-01 +6.42e-02	1.26e-01	5.77e-01	5.80e+00	6
7 6.01e-03	1	+2.55e-01 +5.78e-02	1.38e-02	5.60e-01	2.31e+00	3
8.56e-02	2	+3.56e-01 +1.09e-01	1.14e-01	4.45e-01	1.62e+00	4
8 3.61e-03	1	+3.52e-01 +1.22e-01	1.34e-02	4.21e-01	3.70e+00	4
1.62e-01	2	+4.91e-01 +2.22e-01	1.71e-01	2.97e-01	1.10e+00	4
9 2.61e-03	1	+4.84e-01 +2.32e-01	1.25e-02	2.67e-01	4.79e+00	3
2.45e-01	2	+6.13e-01 +3.60e-01	1.82e-01	1.76e-01	7.50e-01	5
10 2.02e-03	1	+6.07e-01 +3.66e-01	9.24e-03	1.55e-01	4.57e+00	3
3.69e-01	2	+7.23e-01 +5.09e-01	1.84e-01	9.39e-02	5.03e-01	6
11 1.63e-03	1	+7.17e-01 +5.14e-01	6.75e-03	8.00e-02	4.15e+00	3
5.50e-01	2	+8.18e-01 +6.60e-01	1.78e-01	4.26e-02	3.24e-01	6
12 1.36e-03	1	+8.14e-01 +6.62e-01	4.71e-03	3.45e-02	3.46e+00	3
8.27e-01	2	+8.98e-01 +8.00e-01	1.61e-01	1.49e-02	1.94e-01	5
13 1.18e-03	1	+8.95e-01 +8.01e-01	3.06e-03	1.10e-02	2.58e+00	3
1.27e+00	2	+9.58e-01 +9.14e-01	1.30e-01	3.17e-03	1.02e-01	4

14 1.07e-03	1	+9.57e-01 +9.15e-01	1.67e-03	1.87e-03	1.56e+00	3
0.00e+00	2	+9.57e-01 +9.15e-01	0.00e+00	1.87e-03	4.00e-02	1
15 0.00e+00	1	+9.57e-01 +9.15e-01	0.00e+00	1.87e-03	4.00e-02	1

x =

0.9568
0.9153

no_its =

30

normg =

0.0400

Minimizing rosenbrock function, min at (1, 1)
Initial point [399, -711]
Executing minimization of function rosenbrock
Starting at point [399, -711],
Using DFP method.

outer it.	iteration	x	step size	f(x)	norm(grad)	ls	iters
lambda							
init		+3.99e+02 -7.11e+02		2.56e+12			
1 1.56e-08	1	-5.79e-04 -7.10e+02	3.99e+02	5.05e+07	2.55e+10	24	
5.01e-03	2	+8.87e-01 +7.86e-01	7.11e+02	1.28e-02	1.42e+05	5	
2 3.08e-04	1	+8.87e-01 +7.86e-01	6.98e-05	1.28e-02	2.27e-01	2	
1.17e+00	2	+9.51e-01 +8.99e-01	1.30e-01	4.40e-03	1.84e-01	4	
3	1	+9.49e-01	1.96e-03	2.62e-03	1.81e+00	3	

1.08e-03			+9.00e-01			
	2		+9.90e-01	8.82e-02	3.51e-04	4.77e-02
1.85e+00			+9.78e-01			3
	4	1	+9.90e-01	0.00e+00	3.51e-04	6.80e-01
0.00e+00			+9.78e-01			1

```

x =
    0.9899
    0.9782

```

```

no_its =
    8

```

```

normg =
    0.6804

```

```

-----
-----
Minimizing rosenbrock function, min at (1, 1)
Initial point [399, -711]
Executing minimization of function rosenbrock
Starting at point [399, -711],
Using BFGS method.

```

outer it.	iteration	x	step size	f(x)	norm(grad)	ls iters
lambda						
init		+3.99e+02 -7.11e+02		2.56e+12		
1	1	-5.79e-04 -7.10e+02	3.99e+02	5.05e+07	2.55e+10	24
1.56e-08						
	2	+8.87e-01 +7.86e-01	7.11e+02	1.28e-02	1.42e+05	5
5.01e-03						
	1	+8.87e-01 +7.86e-01	6.98e-05	1.28e-02	2.27e-01	2
2						
3.08e-04						
	2	+9.51e-01 +9.00e-01	1.31e-01	4.28e-03	1.84e-01	4
8.98e-01						
	1	+9.50e-01 +9.01e-01	1.94e-03	2.55e-03	1.79e+00	3
3						
1.08e-03						

1.86e+00	2	+9.90e-01	8.73e-02	3.35e-04	4.70e-02	3
		+9.79e-01				
4	1	+9.90e-01	0.00e+00	3.35e-04	6.67e-01	1
0.00e+00		+9.79e-01				

x =

0.9901
0.9788

no_its =

8

normg =

0.6666

Minimizing rosenbrock function, min at (1, 1)
Initial point [3990, -7111]
Executing minimization of function rosenbrock
Starting at point [3990, -7111],
Using DFP method.

outer it.	iteration	x	step size	f(x)	norm(grad)	ls	iters
lambda							
init		+3.99e+03 -7.11e+03		2.54e+16			
1	1	-4.58e-05 -7.11e+03	3.99e+03	5.06e+09	2.54e+13	30	
1.57e-10							
	2	+7.83e-01 +6.13e-01	7.11e+03	4.71e-02	1.42e+06	4	
5.00e-03							
2	1	+7.84e-01 +6.13e-01	8.82e-04	4.70e-02	4.34e-01	2	
2.03e-03							
	2	+8.69e-01 +7.47e-01	1.59e-01	2.37e-02	2.76e-01	5	
6.83e-01							
3	1	+8.66e-01 +7.49e-01	3.78e-03	1.80e-02	3.03e+00	3	
1.24e-03							
	2	+9.84e-01	2.37e-01	1.76e-02	1.34e-01	2	

1.77e+00						
		+9.55e-01				
4	1	+9.78e-01	5.93e-03	4.63e-04	5.78e+00	3
1.03e-03		+9.57e-01				
	2	+9.78e-01	0.00e+00	4.63e-04	1.96e-02	1
0.00e+00		+9.57e-01				
5	1	+9.78e-01	0.00e+00	4.63e-04	1.96e-02	1
0.00e+00		+9.57e-01				

```

x =
    0.9785
    0.9574

```

```

no_its =
    10

```

```

normg =
    0.0196

```

```

-----
-----
Minimizing rosenbrock function, min at (1, 1)
Initial point [3990, -7111]
Executing minimization of function rosenbrock
Starting at point [3990, -7111],
Using BFGS method.

```

outer it.	iteration	x	step size	f(x)	norm(grad)	ls	iters
lambda							
init		+3.99e+03 -7.11e+03		2.54e+16			
1	1	-4.58e-05 -7.11e+03	3.99e+03	5.06e+09	2.54e+13	30	
1.57e-10							
	2	+7.83e-01 +6.13e-01	7.11e+03	4.71e-02	1.42e+06	4	
5.00e-03							
2	1	+7.84e-01 +6.13e-01	8.82e-04	4.70e-02	4.34e-01	2	
2.03e-03							
	2	+8.69e-01 +7.47e-01	1.59e-01	2.37e-02	2.76e-01	5	
4.87e-01							

3 1.24e-03	1	+8.66e-01 +7.49e-01	3.78e-03	1.80e-02	3.03e+00	3
1.76e+00	2	+9.84e-01 +9.55e-01	2.37e-01	1.76e-02	1.34e-01	2
4 1.03e-03	1	+9.78e-01 +9.57e-01	5.93e-03	4.64e-04	5.78e+00	3
0.00e+00	2	+9.78e-01 +9.57e-01	0.00e+00	4.64e-04	1.96e-02	1
5 0.00e+00	1	+9.78e-01 +9.57e-01	0.00e+00	4.64e-04	1.96e-02	1

x =

0.9785
0.9573

no_its =

10

normg =

0.0196

Minimizing rosenbrock function, min at (1, 1)
Initial point [200, 200]
Executing minimization of function rosenbrock
Starting at point [200, 200],
Using DFP method.

outer it. lambda	iteration	x	step size	f(x)	norm(grad)	ls iters
init		+2.00e+02 +2.00e+02		1.58e+11		
1 6.28e-08	1	-1.20e-03 +2.00e+02	2.00e+02	4.02e+06	3.18e+09	23
4.99e-03	2	-5.04e-01 +2.54e-01	2.00e+02	2.26e+00	4.01e+04	5
2	1	-4.89e-01	1.54e-02	2.24e+00	3.00e+00	3

5.12e-03			+2.54e-01			
	2	-2.81e-01	2.92e-01	1.73e+00	3.05e+00	3
1.37e-01		+4.88e-02				
3	1	-2.56e-01	3.52e-02	1.58e+00	8.46e+00	3
4.16e-03		+7.38e-02				
	2	-1.53e-01	1.18e-01	1.34e+00	2.34e+00	7
5.21e-02		+1.65e-02				
4	1	-1.26e-01	3.09e-02	1.29e+00	3.07e+00	3
1.01e-02		+3.06e-02				
	2	-2.73e-02	1.02e-01	1.06e+00	3.31e+00	7
4.54e-02		+2.80e-03				
5	1	+7.66e-03	3.57e-02	9.87e-01	2.07e+00	6
1.72e-02		-4.26e-03				
	2	+8.96e-02	8.20e-02	8.39e-01	2.15e+00	7
3.71e-02		-2.18e-03				
6	1	+1.19e-01	5.07e-02	8.38e-01	2.51e+00	2
2.02e-02		+3.91e-02				
	2	+2.43e-01	1.26e-01	5.77e-01	5.80e+00	6
6.89e-02		+6.42e-02				
7	1	+2.55e-01	1.38e-02	5.60e-01	2.31e+00	3
6.01e-03		+5.78e-02				
	2	+3.56e-01	1.14e-01	4.45e-01	1.62e+00	4
8.56e-02		+1.09e-01				
8	1	+3.52e-01	1.34e-02	4.21e-01	3.70e+00	4
3.61e-03		+1.22e-01				
	2	+4.91e-01	1.71e-01	2.97e-01	1.10e+00	4
1.62e-01		+2.22e-01				
9	1	+4.84e-01	1.25e-02	2.67e-01	4.79e+00	3
2.61e-03		+2.32e-01				

2.45e-01	2	+6.13e-01	1.82e-01	1.76e-01	7.50e-01	5
		+3.60e-01				
10 2.02e-03	1	+6.07e-01	9.24e-03	1.55e-01	4.57e+00	3
		+3.66e-01				
3.69e-01	2	+7.23e-01	1.84e-01	9.39e-02	5.03e-01	6
		+5.09e-01				
11 1.63e-03	1	+7.17e-01	6.75e-03	8.00e-02	4.15e+00	3
		+5.14e-01				
5.50e-01	2	+8.18e-01	1.78e-01	4.26e-02	3.24e-01	6
		+6.60e-01				
12 1.36e-03	1	+8.14e-01	4.71e-03	3.45e-02	3.46e+00	3
		+6.62e-01				
8.27e-01	2	+8.98e-01	1.61e-01	1.49e-02	1.94e-01	5
		+8.00e-01				
13 1.18e-03	1	+8.95e-01	3.06e-03	1.10e-02	2.58e+00	3
		+8.01e-01				
1.27e+00	2	+9.58e-01	1.30e-01	3.17e-03	1.02e-01	4
		+9.14e-01				
14 1.07e-03	1	+9.57e-01	1.67e-03	1.87e-03	1.56e+00	3
		+9.15e-01				
0.00e+00	2	+9.57e-01	0.00e+00	1.87e-03	4.00e-02	1
		+9.15e-01				
15 0.00e+00	1	+9.57e-01	0.00e+00	1.87e-03	4.00e-02	1
		+9.15e-01				

x =

0.9568
0.9153

no_its =

30

normg =

0.0400

Minimizing rosenbrock function, min at (1, 1)
Initial point [200, 200]
Executing minimization of function rosenbrock
Starting at point [200, 200],
Using BFGS method.

outer it.	iteration	x	step size	f(x)	norm(grad)	ls	iters
lambda							
init		+2.00e+02		1.58e+11			
		+2.00e+02					
1	1	-1.20e-03	2.00e+02	4.02e+06	3.18e+09	23	
6.28e-08		+2.00e+02					
	2	-5.04e-01	2.00e+02	2.26e+00	4.01e+04	5	
4.99e-03		+2.54e-01					
2	1	-4.89e-01	1.54e-02	2.24e+00	3.00e+00	3	
5.12e-03		+2.54e-01					
	2	-4.13e-01	1.06e-01	2.00e+00	3.05e+00	9	
2.44e-02		+1.79e-01					
3	1	-3.50e-01	1.02e-01	1.88e+00	2.23e+00	4	
4.59e-02		+9.89e-02					
	2	-2.17e-01	1.64e-01	1.67e+00	7.62e+00	5	
6.05e-03		+3.67e-03					
4	1	-1.89e-01	4.76e-02	1.42e+00	1.06e+01	3	
4.48e-03		+4.24e-02					
	2	-1.08e-01	8.87e-02	1.23e+00	2.30e+00	7	
3.77e-02		+7.26e-03					
5	1	-5.65e-02	5.42e-02	1.17e+00	2.55e+00	5	
2.12e-02		+2.56e-02					
	2	-5.65e-02	0.00e+00	1.17e+00	4.76e+00	1	
0.00e+00		+2.56e-02					
6	1	-5.63e-02	5.57e-04	1.16e+00	4.76e+00	3	

1.17e-04			+2.50e-02				
	2	+1.70e-02	7.40e-02	9.88e-01	4.66e+00	9	
2.72e-02		+1.51e-02					
7	1	+3.14e-02	2.51e-02	9.42e-01	3.62e+00	3	
6.94e-03		-5.48e-03					
	2	+8.13e-02	5.00e-02	8.53e-01	2.26e+00	7	
1.87e-02		-3.01e-03					
8	1	+9.80e-02	2.69e-02	8.21e-01	2.45e+00	3	
1.10e-02		+1.81e-02					
	2	+1.13e-01	1.51e-02	7.93e-01	2.72e+00	6	
3.72e-03		+2.06e-02					
9	1	+1.30e-01	2.10e-02	7.65e-01	2.64e+00	3	
7.96e-03		+8.12e-03					
	2	+1.75e-01	4.66e-02	6.93e-01	2.17e+00	7	
1.66e-02		+1.96e-02					
10	1	+1.82e-01	1.86e-02	6.71e-01	2.38e+00	4	
7.83e-03		+3.69e-02					
	2	+2.33e-01	5.36e-02	5.89e-01	2.06e+00	7	
1.97e-02		+5.45e-02					
11	1	+2.57e-01	2.44e-02	5.69e-01	1.58e+00	3	
1.54e-02		+5.30e-02					
	2	+2.82e-01	2.83e-02	5.33e-01	2.60e+00	6	
5.71e-03		+6.63e-02					
12	1	+2.82e-01	1.29e-02	5.16e-01	2.63e+00	3	
4.90e-03		+7.92e-02					
	2	+3.83e-01	1.17e-01	3.91e-01	1.42e+00	5	
7.23e-02		+1.37e-01					
13	1	+3.82e-01	8.47e-03	3.82e-01	2.12e+00	3	
4.01e-03		+1.45e-01					

1.36e-01	2	+5.16e-01 +2.48e-01	1.69e-01	2.68e-01	1.11e+00	4
14 2.47e-03	1	+5.09e-01 +2.57e-01	1.14e-02	2.41e-01	4.63e+00	3
2.61e-01	2	+6.36e-01 +3.89e-01	1.83e-01	1.57e-01	6.94e-01	6
15 1.93e-03	1	+6.30e-01 +3.95e-01	8.75e-03	1.37e-01	4.54e+00	3
3.96e-01	2	+7.43e-01 +5.40e-01	1.84e-01	8.12e-02	4.62e-01	6
16 1.57e-03	1	+7.38e-01 +5.44e-01	6.30e-03	6.86e-02	4.02e+00	3
5.94e-01	2	+8.36e-01 +6.89e-01	1.75e-01	3.53e-02	2.94e-01	6
17 1.32e-03	1	+8.32e-01 +6.92e-01	4.34e-03	2.82e-02	3.29e+00	3
8.96e-01	2	+9.12e-01 +8.25e-01	1.55e-01	1.15e-02	1.73e-01	5
18 1.16e-03	1	+9.09e-01 +8.27e-01	2.74e-03	8.23e-03	2.37e+00	3
1.38e+00	2	+9.67e-01 +9.32e-01	1.20e-01	2.09e-03	8.74e-02	4
19 1.05e-03	1	+9.66e-01 +9.33e-01	1.40e-03	1.17e-03	1.33e+00	2
0.00e+00	2	+9.66e-01 +9.33e-01	0.00e+00	1.17e-03	3.14e-02	1
20 0.00e+00	1	+9.66e-01 +9.33e-01	0.00e+00	1.17e-03	3.14e-02	1

x =

0.9659
0.9327

no_its =

40

normg =

0.0314

Minimizing Booth, min at (1, 3)
Initial point [9, 10]
Executing minimization of function $@(x)(x(1)+2*x(2)-7)^2+(2*x(1)+x(2)-5)^2$
Starting at point [9, 10],
Using DFP method.

outer it.	iteration	x	step size	f(x)	norm(grad)	ls	iters
lambda							
init		+9.00e+00 +1.00e+01		1.01e+03			
1	1	+1.44e+00 +2.56e+00	1.06e+01	3.95e-01	1.91e+02	3	
5.56e-02							
	2	+1.00e+00 +3.00e+00	6.29e-01	8.12e-16	1.26e+00	3	
5.00e-01							
2	1	+1.00e+00 +3.00e+00	0.00e+00	8.12e-16	1.71e-07	1	
0.00e+00							

x =

1.0000
3.0000

no_its =

4

normg =

1.7099e-07

Minimizing Booth, min at (1, 3)
Initial point [9, 10]
Executing minimization of function $@(x)(x(1)+2*x(2)-7)^2+(2*x(1)+x(2)-5)^2$

Starting at point [9, 10],
Using BFGS method.

outer it.	iteration	x	step size	f(x)	norm(grad)	ls iters
lambda						
init		+9.00e+00 +1.00e+01		1.01e+03		
1	1	+1.44e+00 +2.56e+00	1.06e+01	3.95e-01	1.91e+02	3
5.56e-02						
	2	+1.00e+00 +3.00e+00	6.29e-01	8.12e-16	1.26e+00	3
5.00e-01						
2	1	+1.00e+00 +3.00e+00	0.00e+00	8.12e-16	1.71e-07	1
0.00e+00						

x =

1.0000
3.0000

no_its =

4

normg =

1.7099e-07

Minimizing Booth, min at (1, 3)
Initial point [113, 999]
Executing minimization of function @(x)(x(1)+2*x(2)-7)^2+(2*x(1)+x(2)-5)^2
Starting at point [113, 999],
Using DFP method.

outer it.	iteration	x	step size	f(x)	norm(grad)	ls iters
lambda						
init		+1.13e+02 +9.99e+02		5.92e+06		
1	1	-3.95e+02 +3.92e+02	7.92e+02	3.08e+05	1.42e+04	3
5.59e-02						
	2	+9.97e-01 +3.00e+00	5.55e+02	1.80e-04	1.11e+03	3
5.00e-01						
2	1	+9.97e-01	0.00e+00	1.80e-04	8.04e-02	1
0.00e+00						

+3.00e+00

x =

0.9971
2.9966

no_its =

4

normg =

0.0804

Minimizing Booth, min at (1, 3)
Initial point [113, 999]
Executing minimization of function @(x)(x(1)+2*x(2)-7)^2+(2*x(1)+x(2)-5)^2
Starting at point [113, 999],
Using BFGS method.

outer it.	iteration	x	step size	f(x)	norm(grad)	ls	iters
lambda							
init		+1.13e+02 +9.99e+02		5.92e+06			
1	1	-3.95e+02 +3.92e+02	7.92e+02	3.08e+05	1.42e+04	3	
5.59e-02							
	2	+9.97e-01 +3.00e+00	5.55e+02	1.80e-04	1.11e+03	3	
4.97e-01							
2	1	+9.97e-01 +3.00e+00	0.00e+00	1.80e-04	8.04e-02	1	
0.00e+00							

x =

0.9971
2.9966

no_its =

4

normg =

0.0804


```

-----
-----
Minimizing Styblinski-Tang function, min at (-2.904, ..., -2.904)
Initial point [-3, -3]
Executing minimization of function @(x)1/2*(x(1)^4-16*x(1)^2+5*x(1)+x(2)^4-
16*x(2)^2+5*x(2))
Starting at point [-3, -3],
Using DFP method.

```

outer it.	iteration	x	step size	f(x)	norm(grad)	ls	iters
lambda							
init		-3.00e+00 -3.00e+00		-7.80e+01			
1	1	-2.90e+00 -2.90e+00	1.36e-01	-7.83e+01	4.95e+00		4
2.76e-02							
	2	-2.90e+00 -2.90e+00	0.00e+00	-7.83e+01	0.00e+00		1
0.00e+00							
2	1	-2.90e+00 -2.90e+00	0.00e+00	-7.83e+01	0.00e+00		1
0.00e+00							

```

x =
    -2.9035
    -2.9035

```

```

no_its =
    4

```

```

normg =
    0

```

```

-----
-----
Minimizing Styblinski-Tang function, min at (-2.904, ..., -2.904)
Initial point [-3, -3]
Executing minimization of function @(x)1/2*(x(1)^4-16*x(1)^2+5*x(1)+x(2)^4-
16*x(2)^2+5*x(2))
Starting at point [-3, -3],
Using BFGS method.

```

outer it.	iteration	x	step size	f(x)	norm(grad)	ls	iters
lambda							
init		-3.00e+00 -3.00e+00		-7.80e+01			
1	1	-2.90e+00 -2.90e+00	1.36e-01	-7.83e+01	4.95e+00		4
2.76e-02							

```

0.00e+00      2      -2.90e+00      0.00e+00      -7.83e+01      0.00e+00      1
              -2.90e+00
      2      1      -2.90e+00      0.00e+00      -7.83e+01      0.00e+00      1
0.00e+00      -2.90e+00

```

```

x =
    -2.9035
    -2.9035

```

```

no_its =
    4

```

```

normg =
    0

```

```

-----
-----
Minimizing Styblinski-Tang function, min at (-2.904, ..., -2.904)
Initial point [-1.5, -1.5]
Executing minimization of function @(x)1/2*(x(1)^4-16*x(1)^2+5*x(1)+x(2)^4-
16*x(2)^2+5*x(2))
Starting at point [-1.5, -1.5],
Using DFP method.

```

outer it.	iteration	x	step size	f(x)	norm(grad)	ls	iters
lambda							
init		-1.50e+00 -1.50e+00		-3.84e+01			
1	1	-2.16e+00 -2.16e+00	9.37e-01	-6.38e+01	2.79e+01		9
3.36e-02							
	2	-2.90e+00 -2.90e+00	1.05e+00	-7.83e+01	2.39e+01		6
1.91e-01							
2	1	-2.90e+00 -2.90e+00	0.00e+00	-7.83e+01	5.12e-06		1
0.00e+00							

```

x =
    -2.9035
    -2.9035

```

```

no_its =

```

4

normg =

5.1238e-06

Minimizing Styblinski-Tang function, min at (-2.904, ..., -2.904)
Initial point [-1.5, -1.5]
Executing minimization of function $@(x)1/2*(x(1)^4-16*x(1)^2+5*x(1)+x(2)^4-16*x(2)^2+5*x(2))$
Starting at point [-1.5, -1.5],
Using BFGS method.

outer it.	iteration	x	step size	f(x)	norm(grad)	ls	iters
lambda							
	init	-1.50e+00 -1.50e+00		-3.84e+01			
1	1	-2.16e+00 -2.16e+00	9.37e-01	-6.38e+01	2.79e+01		9
3.36e-02							
	2	-2.90e+00 -2.90e+00	1.05e+00	-7.83e+01	2.39e+01		6
1.91e-01							
2	1	-2.90e+00 -2.90e+00	0.00e+00	-7.83e+01	4.14e-06		2
0.00e+00							

x =

-2.9035
-2.9035

no_its =

4

normg =

4.1431e-06

Minimizing Styblinski-Tang function, min at (-2.904, ..., -2.904)
Initial point [-1, -1]
Executing minimization of function $@(x)1/2*(x(1)^4-16*x(1)^2+5*x(1)+x(2)^4-16*x(2)^2+5*x(2))$
Starting at point [-1, -1],
Using DFP method.

outer it.	iteration	x	step size	f(x)	norm(grad)	ls	iters
lambda							
	init	-1.00e+00 -1.00e+00		-2.00e+01			
1	1	-1.00e+00 -1.00e+00	0.00e+00	-2.00e+01	2.33e+01		1
0.00e+00							

x =

-1
-1

no_its =

2

normg =

23.3345

Minimizing Styblinski-Tang function, min at (-2.904, ..., -2.904)
Initial point [-1, -1]
Executing minimization of function @(x)1/2*(x(1)^4-16*x(1)^2+5*x(1)+x(2)^4-16*x(2)^2+5*x(2))
Starting at point [-1, -1],
Using BFGS method.

outer it.	iteration	x	step size	f(x)	norm(grad)	ls	iters
lambda							
	init	-1.00e+00 -1.00e+00		-2.00e+01			
1	1	-1.00e+00 -1.00e+00	0.00e+00	-2.00e+01	2.33e+01		1
0.00e+00							

x =

-1
-1

no_its =

2

normg =

23.3345

diary off