

1.

H)

```
[[ 0 9 3]
 [ 6 -2 -3]
 [ 6 7 0]]
```

I)

```
[[0 9 3 8]
 [6 7 0 8]]
```

J)

-3

K)

```
[5. 0.25 5.25]
```

L)

```
[[ 1.      -0.91113026 -0.9899925 -0.14550003]
 [ 0.96017029 -0.41614684 -0.9899925  1.      ]
 [ 0.96017029  0.75390225  1.      -0.14550003]]
```

M)

```
print(np.sum(A, axis=0)**2)
```

N)

```
[[154 -27 127]
 [-27 49 22]
 [127 22 149]]
```

O)

```
84.66666666666667
```

2.

D)

```
#mymeasure(200,400)
```

```
Execution time using myfun: 9.17061400414
```

```
Execution time using numpy: 0.0112099647522
```

```
Magnitude of C1-C2: 1.867491050688841e-09
```

```
#mymeasure(1000,2000)
```

```
Execution time using myfun: 1146.19640589
```

```
Execution time using numpy: 0.0920147895813
```

```
Magnitude of C1-C2: 4.4655888586930814e-07
```

4.

E)

Training error: 3.763657218038999

Testing error: 6.1705478280929755

F)

Training error: 1.9591614228588496

Testing error: 7.227975523751791

G)

Training error: 6.235893918438665e-07

Testing error: 137.88135215073635

5.

B)

Training error: 2.3101212530571362

Validation error: 5.425038263371023

D)

Optimal gamma: 0.00033546262790251185

Optimal w0: 20.630914390150604

Optimal training error: 4.176408110816925

Optimal validation error: 4.035002997369604

Optimal testing error: 6.30505197938391

6.

D)

Final training error: 4.6

Final testing error: 7.

myfit_reg train: 4.659885405607875

myfit_reg test: 7.626009352777524

Delta difference (myfit_reg_gd & myfit_reg): -0.06

Learning Rate: 0.001