hw4_4.5

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In [46]: import numpy as np
         from functools import reduce
```

1 Problem(a)

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In [57]: with open("hw4_nasdaq00.txt","r") as f:
             price = f.readlines()
         price = list(map(lambda x:float(x.strip()),price))
         row_a1 = [np.array([price[i-1],price[i-2],price[i-3]]) * price[i-1] for i in range(3,
         row_a1 = np.sum(row_a1,axis=0)
         row_a2 = [np.array([price[i-1],price[i-2],price[i-3]]) * price[i-2] for i in range(3,
         row_a2 = np.sum(row_a2,axis=0)
         row_a3 = [np.array([price[i-1],price[i-2],price[i-3]]) * price[i-3] for i in range(3,
         row_a3 = np.sum(row_a3,axis=0)
         A = np.vstack((row_a1,row_a2))
         A = np.vstack((A,row_a3))

         b1 = reduce(lambda x,y:x+y,[price[i-1]*price[i] for i in range(3,len(price))])
         b2 = reduce(lambda x,y:x+y,[price[i-2]*price[i] for i in range(3,len(price))])
         b3 = reduce(lambda x,y:x+y,[price[i-3]*price[i] for i in range(3,len(price))])
         b = np.zeros((3,))
         b[0] = b1
         b[1] = b2
         b[2] = b3
         a_vec = np.linalg.solve(A,b)
         print("The coefficient: \na1 = {}\na2 = {}\na3 = {}".format(a_vec[0],a_vec[1],a_vec[2]
```

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The coefficient:
a1 = 0.9506733661404788
a2 = 0.01560133077286545
a3 = 0.03189568516025264
```

2 Problem(b)

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In [65]: with open("hw4_nasdaq01.txt","r") as f:
             price_2001=f.readlines()
```

```
price_2001 = list(map(lambda x:float(x.strip()),price_2001))
predict_2000 = [np.sum(np.array(price[i-3:i][::-1] * a_vec)) for i in range(3, len(pri
predict_2001 = [np.sum(np.array(price_2001[i-3:i][::-1] * a_vec)) for i in range(3, le
print ("2000\'s Mean Square Error is {}".format(np.mean(np.square(np.array(predict_200
print ("2001\'s Mean Square Error is {}".format(np.mean(np.square(np.array(predict_200
```

```
2000's Mean Square Error is 13902.401076367885
2001's Mean Square Error is 2985.0979241108607
```