Question 2

April 17, 2021

[109]:
```
import numpy as np
```

[110]:
```
xLst = [1,2,3,4,5]
yActualLst = [1,3,2,3,5]
```

[111]:
```
def getPolyDesignMatrix(xLst, polyMax):
    rowLength = len(xLst)
    colLength = polyMax + 1

    mat = np.ones((rowLength, colLength))

    for col in range(colLength):
        if (col == 0):
            continue

        for row in range(rowLength):
            mat[row][col] = (xLst[row])**(col)


    return mat
```

[112]:
```
designMatrix = getPolyDesignMatrix(xLst,1)
print("Question 2a")
print("===========")
print("The Design Matrix is:\n")
print(designMatrix)
```

```
Question 2a
===========
The Design Matrix is:

[[1. 1.]
 [1. 2.]
 [1. 3.]
 [1. 4.]
 [1. 5.]]
```

[113]:
```
transposeDesignMatrix = np.transpose(designMatrix)
# print(transposeDesignMatrix)
```

[114]:
```
leftTerm = np.linalg.inv( np.matmul(transposeDesignMatrix,designMatrix))
thethaMatrix = np.matmul(np.matmul(leftTerm, transposeDesignMatrix), yActualLst)

print("Question 2b")
print("===========")
print("thetha array is:\n")

for i,thethaVal in enumerate(thethaMatrix):
    print("thetha {index}: {thetha}".format(index=i,thetha=thethaVal))
```

```
Question 2b
===========
thetha array is:

thetha 0: 0.4000000000000026
thetha 1: 0.8000000000000005
```