Homework 0

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1 Solution to Problem 1

The problem was to find the value for x that maximizes g(x) where $g(x) = -3x^2 + 24x - 30$. First, you need to take the derivate and equal it to zero to solve for critical points. This is $24 - 6x = 0$. Now, we subtract 24 and then divide by negative 6 to prove that the value that maximizes x is equal to 4.

2 Solution to Problem 2

The problem was to find the value for x that maximizes g(x) where $g(x) = -3x^2 + 24x - 30$. First, you need to take the derivate and equal it to zero to solve for critical points. This is $24 - 6x = 0$. Now, we subtract 24 and then divide by negative 6 to prove that the value that maximizes x is equal to 4.

3 Solution to Problem 3

3.1

You are unable to multiply the two matrices because the number of columns in matrix A is not equal to the number of rows in matrix B.

3.2

The first step in the is problem is to find the transpose of matrix A. The transpose of matrix A is:

$$A^T = \begin{bmatrix} 1 & 2 \\ 4 & -1 \\ -3 & 3 \end{bmatrix}$$

Now that the colums match the number of rows in matrix B, we can now multiply them togethering resulting:

$$\begin{bmatrix} -2 & -2 & 13 \\ -8 & 1 & 16 \\ 6 & -3 & -3 \end{bmatrix}$$

To calculate the rank, we simply transform the matrix to its row echolon form and count the number of non-zero rows. We get an answer of 2 for our rank.

3.3 Code

Below, I show two code snippets of me multiplying A^T and B in Numpy along with Tensorflow.

```
#By Sami Ellougani
import numpy as np
import tensorflow as tf

#Multiplying matrix's with numpy
a = np.array([[1, 2], [4, -1], [-3, 3]])
b = np.array([[-2, 0, 5], [0, -1, 4]])
print(np.dot(a,b))

#Multiplying matrix's with tensorflow
a = tf.constant(a)
b = tf.constant(b)

with tf.Session() as sess:
        print(tf.matmul(a,b).eval())
```

Here are my reults from the command line:

```
> python matrixMult.py
[[-2 -2 13]
 [-8 1 16]
 [6 -3 -3]]

[[-2 -2 13]
 [-8 1 16]
 [6 -3 -3]]
```

4 Solution to Problem 4