Q355, week 3

15 points

For this assignment, you will first do some linear algebra exercises, then use python to do them.

1. Using Desmos.com or your favorite plotting software, plot the lines defined by each of the two equations on a graph, and then solve for x and y (2 pts)

4x + 3y = 31

2x – 8y = -32

2. Write the system of equations above as a matrix multiplication expression (2 pts)

3. What is the transpose of $\begin{bmatrix} 1 & 4 & 7 \\ 2 & 3 & 0 \end{bmatrix}$? (2 pts)

4. Can you invert the matrix c= $\begin{bmatrix} 1 & 2 \\ 3 & 6 \end{bmatrix}$? Why or why not? (2 pts)

5. Calculate the dot product of the vectors a = [1 4 -3], and b = [2 -4 1]. What is the angle between them, in degrees? (2 pts)

6. A perceptron has a weight matrix of W = [1 -3 4] and bias b = -2.

Using the equation V = $\sum_{i=1}^{N} W_i x_i + bias$

Determine whether the input pattern x = [3 5 -4] is sufficient to "activate" the perceptron with V > 0 (2 pts)

7. Using python, write a script that takes the two equations below.

8x +2y = 52

3x – 4y = 29

In your python script, do the following (3 pts):

a) represent the system of equations as numpy arrays.

b) solve the system **using matrix inversion**

c) plot the two lines corresponding to each equation on a 2D graph using pyplot

Submit your python code and the plot of question 7c to Canvas, along with your answers to the assignment.