MIDTERM EXAM- ALL PROBLEMS CARRY EQUAL WEIGHT

ELECTRONIC SUBMISSION (WITH CODE) DUE NOVEMBER 11, 2020, 4 PM

This is an exam. Please make your submitted work is only attributed to you.

(1) Demonstrate that PLA for d dimensional linearly seperable data, can be written as a linear program of the form,

$$\max_{w} \quad c^T w$$
$$\text{s.t.} \quad Aw \geq b.$$

Please provide the matrix A, vector b, and vector c.

(2) Argue that the VC dimension of convex d-gons (poylgon with d sides) is 2d+1.

(3) Exercise 3.10 (From LFD book) (page 98)

(4) Problem 3.3 (From LFD book)

(5) Consider the function

$$f(x_1, x_2) = e^{x_1 + 3x_2 - 0.1} + e^{x_1 - 3x_2 - 0.1} + e^{-x_1 - 0.1}$$

(a) Plot the level sets of $f(x_1, x_2) = k$ for different positive values of k.

(b) Compute the gradient of the function.

(c) Utilize the gradient descent algorithm to optimize the function, report the minimum, and plot the progression towards the minimum.