CS412 Machine Learning - 2023
HW3-Gradient Descent
50pts

1) **50pts -** We are trying to minimize a function $F(x) = x^2 - 10x + 5$ with respect to its parameter x. In other words we want to find the x for which f(x) is minimum.

   Starting from the point x=10 use steepest descent algorithm *for TWO steps* to find the local minimum of the function around this point. You should use a "step size" of $\alpha = 0.1$ in update, as: $x = x - \alpha \times \nabla$

   We will use a subscript to indicate the subsequent values of x, starting from x_0.

   Worksheet:

   $F(x_0) = ...5......................$ *: Just to note at what F value we start (5pts)*

   $\nabla F = ...2x - 10...............................$ *: Compute the gradient (10pts)*

   Note: Even though F is a function of a single variable, you can still write/think of the gradient as a vector of size one.

   $\nabla F \mid x_0 = ...10.............................$ *: This is the gradient **evaluated** at x_0 (10pts)*

   $x_1 = ...9..$ *:Update x_0 to find x_1 (5pts)*

   $F(x_1) = ...-4.............................$ *: just checking to see if we are indeed minimizing*

   Now do the 2nd step similarly and write your results below (no partial so be careful please):   :20pts

   ANSWER: x_2 (x after 2 steps of gradient descent)= ...... 8.2 .... $f(x_2)$ = ... -9.76 ....

Submission: Write the ANSWER line as inline submission to homework and attach the filled page as a pdf document to Sucourse.