Week 4
Short Answers Assignment 4

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For the following problems, use these weights:
w_1 = 0.75
w_2 = 0.45
w_0 = 0.5
With this sample:
x_1 = 2
x_2 = 0.6

1. **In a linear regression model, what would the output be?**

   From the Given values,
   Linear Regression Model Output (Y) = w0 + w1 X1 + w2 X2
   Y = 0.5 + 0.75 (2) + 0.45 (0.6)
   Y = 0.5 + 1.5 + 0.27
   Y = 2.27

   Linear Regression is 2.27.

2. **In a perceptron, what would the output be? (Positive class or negative class?)**

   From the above Given Values
   Perceptron (Z) = w0 + w1 X1 + w2 X2
   Z = 0.5 + 0.75 (2) + 0.45 (0.6)
   Z = 0.5 + 1.5 + 0.27
   Z = 2.27

   Z value is greater than 0. Hence perceptron would output the positive class.

3. **In a logistic regression model, what would the output be (in terms of a posterior probability)?**

   logistic regression model

   $P = 1 / \ 1 + e^{-Z}$
   Z = w0 + w1 X1 + w2 X2
   Z = 0.5 + 0.75 (2) + 0.45 (0.6)
   Z = 2.27
   $P = 1 / 1 + e^{-2.27}$
   P = 1.103

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4. **Say we added a higher order product term, $x_1 * x_2$ with a new weight $w_3 = 0.25$. Compute the posterior probability of a logistic regression model.**

   Posterior probability of a logistic regression model

   $y = w0 + w1\ X1 + w2\ X2 + w3X1X2$
   $y = 0.5 + 0.75\ (2) + 0.45\ (0.6) + 0.25(0.75)\ (0.45)$
   $y = 2.3543$

   $P = 1 /\ \ 1 + e^{-y}$

   $P = 1 /\ \ 1 + e^{-2.3543}$

   $P = 0.095$

5. **After completing the programming assignment, adjust the l2 regularization on the notMIST logistic regression model. Try values 1, 0.1, 0.01, and 0. Which produces the lowest error? Why do you think this is the case?**

   While I2 = 0.01, the error = 0.57

   While I2 = 0.1, the error = 0.99

   While I2 = 0, the error = 0.41

   While I2 = 1, the error = 1.91.

   The lowest error produced is I2 = 0 for epoch = 100

   This may cause depends on the data it may be because of overfitting or validation data set.