Question 12

In a KNN (K nearest neighbor) application problem for 6NN (six training points are closest to the test point P), the training data had three of the six points in class "yes" and the other three points in class  "no". Note that there are equal number of points in each class. The distances of the three points in the "yes" class from the test point P are 3, 4, and 5. The distances of other three points in the "no" class from the test point P are 2, 3 and 6.  Compute and specify the class in which you will place the test point P in (decide between "yes" or "no" classes) for this classification problem for 6NN. Show all working. You may do it on paper and upload your working (if you are using a cell phone camera app, make sure the writing on each page is very clear and you upload a PDF file).  Details of working are as important as your final answer.

**Yes =     ⅓^2 + ¼^2 + ⅕^2 = 1/9 + 1/16 + 1/25 =     400/3600 + 225/3600 + 144/3600 =**

**769/3600 (can’t be reduced, but not close to half)**

**No =     ½^2 + ⅓^2 + ⅙^2 = ¼ + 1/9 + 1/36 =     324/1296 + 144/1296 + 36/1296 =**

**504/1296 =     21/54 (almost half)**

**Because “No”s weight factor is so much higher, I would classify this data point as “No”**

Question 13

The following set of records have the following classes:

|  |  |  |
| --- | --- | --- |
| Height | Weight | Class |
| 5 | low | yes |
| 6 | medium | no |
| 8 | high | yes |

Using Naive Bayes method, find the class for the test record with Height 7 and weight "High".

Show all working. You may do it on paper and upload your working (if you are using a cell phone camera app, make sure the writing on each page is very clear and you upload a PDF file).  Details of working are as important as your final answer.

P(“High” | Yes) = 1

P(“High” | No) = 0

P(7 | Yes) = 0

P(7 | No) = 0

Answer is “Yes”, as 7 has no match, but all variables with weight “High” have the class “Yes”.

Question 14

Given two dice (each with six numbers from 1 to 6):

(a) what is the entropy of the event of getting a total of greater than 10 in one throw?

    Probability of 11: 3/36 = 0.083  
    Probability of 12: 1/36 = 0.027

    Entropy = -(.083(log2(.083))) - (.0.027(log2(.027)))  = .298 - .14 = 0.158

(b) what is the entropy of the event of getting a total of equal to 6 in one throw?

    Probability of 6: 5/36 = 0.139

    Entropy = -(.139(log2(.139))) = 0.395

What is the Information GAIN going from state (a) to state (b)?

    0.158 - .395 = -0.237

Please show all working and the final result. Show all working. You may do it on paper and upload your working (if you are using a cell phone camera app, make sure the writing on each page is very clear and you upload a PDF file).  Details of working are as important as your final answer.

Question 15

