MAT 1372 Statistics with Probability Practice Final Exam Spring 2018

**You may prepare a 2 page, one sheet, handwritten formula sheet.**

*Exam will be done in 2 parts. Once you have submitted part 1, you may work on part 2.*

**Part1: No Excel. Use instead a graphing calculator if needed.**

Problems similar to 3 of the following 5 problems will appear (20 pts for each problem).

1. A fair coin is tossed (0 tail, 1 head) and a fair die (1, 2, 3, 4) is rolled.
   1. List the sample space as a set of coordinates: (coin; die)=(0 or 1; 1, 2, 3 or 4)
   2. Write the event A= “sum of coordinates is 2 or 3” as set and find P(A).
   3. Write the event B= “1st coordinate is 0” as a set and find P(B).
   4. Write the event A∩B as a set and find P(A∩B).
   5. Are A and B independent?
2. The distribution of grades on a quiz taken

by 100 students is given in the table:

(a) Compute the mean and standard deviation of this distribution.

(b) Find mean & the standard error for random sample of size n=16.

(c) What value of n is needed so that the standard error is .1?

1. 4% of a clinic’s patients are known to have Lyme’s disease. A test is developed that is positive in 98% of patients with Lyme’s disease, but it is also positive in 3% of patients who do not have disease. Fill in the following table (use all available digits).



1. What is probability that test comes out positive for Lyme’s disease?
2. What is probability that person has Lyme’s disease given positive test?
3. What is probability that a person has disease given a negative test (false negative)?
4. A manufacturer wants to know if an experimental version of its child toothpaste differs in its ability to prevent tooth decay from the existing formula. For children using its existing formula, cavities per yr. are normal with mean 3.03 & standard deviation 1.12. A study of 100 children using new version found average of 2.83 cavities. **Two tailed**.
5. Calculate the standard error (SE).
6. Draw the normal curve and label sample mean, mean plus/minus SE, mean plus/minus 2SE and the average experimental value. Sketch in appropriate tail.
7. Standardize and mark off the z-value on the Z labeling of the horizontal axis in b).
8. Use your calculator to find the p-value.
9. Does the experimental version’s cavity prevention differ from the existing formula?
10. Mauna Loa is a major Hawaiian volcano. Its eruptions have been shown to follow roughly a Poisson process. Within a 10 year period, on average there are 3 eruptions.
    1. In the next 10 years, what is the chance that there will be at least one eruption?
    2. In the next 10 years, what is the chance that there will be exactly 3 eruptions?
    3. In the next 10 years, what is the chance that there will be fewer than 3 eruptions?
    4. In the next 20 years, what is the chance that there will be exactly 6 eruptions?
    5. Why or why not is your answer to d. the square of your answer to b.?

**Part 2: Down- and up-load the Excel file from Blackboard.**

**Please make sure your name becomes part of the file name.**

Problems similar to each of the following problems will appear (20 pts each).

1. The FDA has decided to measure 8-ounce cans of Hershey Cocoa. The weights of 50 containers are found in the accompanying excel file. **Single tailed.**
   1. Make a histogram to verify that the weights are approximately normally distributed and describe any skewing.
   2. Use the data to calculate the sample standard deviation and mean.
   3. Find the standard error.
   4. Use an appropriate test and the p-value approach to determine if the cans do not contain the claimed weight.
2. Do people spend more time reading ads that agree with their disposition? An antismoking group conducted a survey asking those who saw an advertisement against smoking if (1) they read headline only, (2) some detail, or (3) most of advertisement. The questionnaire asks respondents to identify themselves as heavy smokers (1), moderate smokers (2), light smokers (3) or nonsmokers (4). The result is found in the accompanying excel file (col A: type of smoker, col B: amt of advertisement read). Does how much you smoke affect how much you read of an antismoking advertisement? Use a pvalue approach at the 10% level.