MAT 1372 Statistics with Probability Practice Final Exam Fall 2012

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

**Part1: Please have your computer screens turned off and your keyboard placed on your computer. You may use a graphing calculator on part 1 but you may not rely on any of the statistical/probabilistic functions/tools. You should make use of the formula sheet that you have prepared. Please submit the formula sheet as part of your exam. The formula sheet is 20% of your final exam grade.**

1. The probability that an unfair coin lands on heads is 0.6. Coin is tossed 3 times.

a. List the sample space.

b. Construct a random variable X which counts number of heads for the three tosses.

c. Find P(X<1), E(X) and E(1/(X+1))

1. The probability density function is in the form of an isosceles triangle whose x-intercepts are 3 and 15. Find P(X>7).
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. [Use definition of standard deviation (weighted sum of deviations from mean square).]

(b) Find mean & standard deviation of sample mean for random sample of size 16.

1. Suppose you roll two fair dice. Let A= doubles, B= sum is 6

(a) Are A and B disjoint?

(b) Determine P(A), P(B) and P(A and B).

(c) Are A and B independent?

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. A manufacturer wants to know if an experimental version of its child toothpaste works better to prevent tooth decay than the existing formula. For children using its existing formula, cavities per year are normal with mean 3 and standard deviation 1. A study of 900 children using the new version found an average of 2.95 cavities.

\*Can we, at the 5 percent level of significance, establish that the new version is better? (H0:μ≥3, we assume only as good or perhaps even worse than present formulation)

1. Calculate the standard deviation for the sample mean.
2. Draw the normal curve and label sample mean, mean plus/minus SD, mean plus/minus 2SD and the average value. Sketch in appropriate tail.
3. Normalize and add Z axis to the curve from b).
4. Write down but do not evaluate the appropriate Excel command.
5. The answer to (d) turns out to be 6.7%. Please use to answer the question\*.

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

1. Is TV watching among children related to being overweight?

(col A: lbs overwt (or underwt), col B: hr/wk of TV watching).

1. Find the trend line and interpret the slope and y-intercept.
2. What is the correlation coefficient? How closely are the variables correlated?
3. What is the average number of lbs the children are overweight? How many hours of TV do they view per week on average?
4. Verify that the coordinate corresponding to the answers to c. lies on the trend line.
5. The FDA has decided to measure 8-ounce cans of Hershey Cocoa. The weights of 50 containers are found in the accompanying excel file. H0: μ≥8

(a) Use a pvalue approach to the t-test at the α = 5% significance level.

(b) Make a histogram to verify that the weights are approximately normally distributed.

**Extra1** : A president’s Job Approval rating is one of best indicators for assessing his/her chances of reelection. On May 5, 43% of potential voters say they at least somewhat approve of the president's job performance. 53% at least somewhat disapprove. You would like to see if the national opinion is the same as that of New York State. You do a poll of 1000 potential voters randomly sampled from the entire state (See the excel file) and would like to find out if New York’s approval of the President differs from that of the nation as a whole. H0: NYS approval = national approval.

(a) Calculate the Test Statistic and the degree of freedom.

(b) Calculate the p value. At the α=1% significance level, what can you say?

**Extra2** : Do people spend more time reading articles 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? H0: How much of an advertisement someone reads is independent of whether they agree. Use a pvalue approach to decide whether to reject the H0 at the 5% level.