**MGMT 600 – APPLIED MANAGERIAL DECISION MAKING**

**FINAL EXAMINATION**

In completing this exam, you have a choice: **EITHER (1) Answer any four questions OR (2) Answer any three questions and attach a copy (not a link, a copy) of a relevant article (*5 full pages minimum*) from an appropriate journal THAT YOU HAVE READ which pertains to one of the questions you didn’t answer (*clearly summarize the article and indicate how it pertains to the question that you “didn’t answer.”*).** **The exam and ALL COURSEWORK you want counted toward your final grade are due to the CTU Production Center (CALL FOR HOURS - 590 6782/6775) by NOON, Monday, 15 August.**

In answering questions, please exhibit graduate level thinking, analysis, presentation and skills. Please do your own work - do not work together on the exam. Finally, please clearly identify which question (1, 2, etc.) and which part of the question (a., b., etc.) you are answering, and PLEASE SHOW YOUR WORK AND CLEARLY IDENTIFY YOUR ANSWERS.

**If you answer Question 1, Question 2 or Question 3, your response to each question must be a minimum of ONE FULL PAGE (single space, 12 point font, 1” margins on all FOUR edges) of graduate level discussion. Repeating the question is NOT part of your response to the question.**

**Question 1**: Sampling theory is a major area of interest within the field of statistics:

**a.** Give three possible reasons why sampling a population, instead of taking a census of every population member, might make sense.

**b.** Describe the difference between a parameter and a statistic.

**c.** Discuss the term sampling error (don’t just give its definition).

**d.** Use a **diagram** to graphically illustrate and explain how sampling error, level of risk and the level of confidence are related.

**e.** Explain how sampling error can be controlled by using an appropriate sampling method.

**Question 2**: The Central Limit Theorem is one of the important cornerstones of modern statistical analysis:

**a.** Describe the Central Limit Theory in your own words and discuss an example of its application (don't simply copy or recite the text).

**b.** What types of random variables and probability distributions are covered (or not covered) by the Central Limit Theorem.

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**c.** Discuss the difference between the parent X distribution and the sampling distribution of X (X Bar).

**d.** If X is normally distributed, what must be the sample size for X Bar to be normally distributed (read carefully and think before you answer).

**Question 3**: An economic research company in this area wants to assess consumer confidence about the next calendar year. Of the four sampling methods described in Chapter 8, which two would you recommend that the company consider using, and why (justify your two choices).

**Question 4:** It’s 10 PM – do you know where your trash can is? In our neighborhood, there have been a varying number of black bear visits each year over the past six years. These visits usually result in a lot of late night noise and mess to clean up in the morning, as the black bears tip over the trash cans and dine on the contents. The number of these black bear visits each year since 2004 is shown below:

Year Number of Annual Black Bear Visits

2005 1

2006 2

2007 1

2008 5

2009 3

2010 3

**a.** Let the random variable *X = Number of Black Bear Visits per Year*, and construct a probability distribution (table and chart) for this population, i.e. show *X* and *P(X)*.

**b.** Construct the sampling distribution of the sample means (table and chart) for n = 2.

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**c**  In words, what does the random variable, *X*, (X-bar) stand for in this problem.

**d.** Compute the mean of the sampling distribution; how does this compare with the population mean of the distribution in part a.

**Question 5**: Recently, a number of public spirited citizens have sued McDonalds, claiming that they became overweight, due to McDonalds' tempting and readily available menu of fast foods (supersized burgers, fries and shakes). Testimony by an expert witness indicated that regular patrons of McDonalds typically visit an average of 11 occasions per week, and that this number of weekly visits should not cause patrons to become overweight. One plaintiff's lawyer (plaintiff's weight at recent checkup -- 345 pounds) claimed that McDonalds' surveillance video tape over a seven week period showed that his client visited an average of 15 occasions per week with a standard deviation of 2 occasions per week. McDonalds stands by its assertion that the number of weekly visits by the typical customer is normally distributed with a mean of 11 occasions per week, and that this number of weekly visits will not cause excessive weight gain. Based on the sample size of 7 weeks (with a sample mean of 15 occasions per week and a sample standard deviation of 2 occasions per week), use the 0.05 level of significance to determine whether the mean number of weekly McDonalds visits by the plaintiff *is different than* the average of 11 occasions per week claimed by McDonalds, and answer the following:

**a.** What distribution should be used for the test of hypothesis and why.

**b.** Is this a two tail test or a one tail test.

**c.** Follow the 5 Step Procedure in the text and show your results (conclusion) for each of the steps.

**Question 6:** House cat owners invest a lot of time and expense to find just the right cat food for their finicky, spoiled and pampered pets. Some house cat owners believe that the reaction of the house cat, in terms of how much time passes between the serving of the food and the point at which the finicky, spoiled and pampered house cat actually starts dining, can be a good indicator of how the food was accepted by the house cat. Recently, my wife conducted an experiment with our female house cat (very, very finicky – different than male who eats anything/everything). She wanted to see if expensive foods would be accepted more quickly by the female than inexpensive foods. Cat Food Brand Cost of Cat Food ($) - X Time to Accept (Minutes) - Y

Fake Fish $1.00 18

Plain Fish $2.00 14

# Fancy Fish $3.00 12

Gourmet Fish $5.00 9

Eau de Fische $6.00 5

**a.** Do a Scatter Plot of this data and label the axes.

**b.** Assume you’ve computed r using Equation 13-1 on page 464, and r = - 0.60 (NOTE: DO NOT compute r yourself, instead use the assumed value of r = - 0.60 for parts b. and c. of this problem). What amount of variation (percent) in the Time to Accept is explained by the variation in the cost of the cat food, and what amount of variation (percent) is not explained.

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**c.** Compute the Corrected Coefficient of Determination, r 2 , for the linear regression equation

model, using the r-value shown in part b. and assuming n = 5: {r 2 = r 2 – [1 - r 2 ][(k – 1)/(n – k)]}.

**d.** Assume that my wife has me derive the following linear regression model for the Cost of Cat Food – Time to Accept data described above, what do Y' and X refer to in the context of this equation.

Y’ = 21 – 2.80X (NOTE: Use this equation, do not derive your own)

**e.** My wife decides to try a new brand of cat food, *La Creame de la Mar*, which costs $4.00. Using the above regression model in part d., what is the predicted time to accept for this brand.

**f.** If the actual time to accept for this brand is 2 minutes, explain why (in terms of increasing the explained variation, relative to the total variation) multiple regression might be a better choice to model this problem, and describe two additional and relevant predictor variables that could be used.

(No house cats were harmed in conducting this research or in gathering research data.)

**Question 7:** According to news reports, Las Vegas betting parlors increased the number of proposition (prop) bets available to gamblers for this year's Super Bowl (Example: Which team will be the first to suspend a starting player for a team rules violation?). It is believed that the mean number of prop bets per typical gambler is normally distributed with a mean of 7 and a standard deviation of 5. A survey of the first 36 gamblers to place bets on Super Bowl Sunday at the Mirage indicated that the sample mean number of such prop bets was 9. At the 0.05 level of significance, is the population mean number of prop bets per gambler *more than* 7. Complete the following as part of your solution process:

**a.** State the null hypothesis and the alternative hypothesis.

**b.** Is this a one tail or a two tail test.

**c.** Follow the 5 Step Procedure in the text and show your results for each of the steps.

**d.** What is your decision and why.

**Question 8:** In business, time is money. A local entrepreneur wants to start a regional 24/7 package delivery service for businesses along the front range. A key planning assumption is that, with Colorado Springs as the collection and distribution hub, package delivery times throughout this region will follow a Normal Probability Distribution. Using US Postal Service data and other information, an analyst constructs the following projected package delivery times (in hours) for the front range region:

Hours Frequency

1 up to 3\* 5

# 3 up to 5 12

5 up to 7 20

7 up to 9 30

9 up to 11 25

11 up to 13 8

\* Recall that "up to 3" doesn't include 3.

Given the hypotheses: H0: The package delivery time is approximately Normal\*\*

H1: The package delivery time is not approximately Normal

\*\* "Normal" means that the Normal Probability Distribution is followed.

**a.** What is the random variable for this problem.

**b.** Using Expected Value, find the mean and standard deviation for the information given.

**c.** Using the 0.05 level of significance and a Chi Square Goodness of Fit test, state your conclusion as to whether the package delivery times, in hours, are Normally distributed (follow the Normal pattern).