Salt Lake Community College
MATH 1040 Final Exam Fall Semester 2011
Form A

Name_____ **Instructor**_____

Time Limit: 120 minutes

Any hand-held calculator may be used. Computers, cell phones, or other communication devices are not allowed.

This exam has two parts.
Part I - Ten multiple choice questions
Part II - Ten open ended questions

Part I

Instructions: Answer all ten questions. Circle the letter of the most correct answer. No partial credit will be awarded on this part of the examination.

1) Before opening a new dealership, an auto manufacturer wants to gather information about car ownership and driving habits of the local residents. The marketing manager of the company randomly selects 1000 households from all households in the area and mails a questionnaire to them. Of the 1000 surveys mailed, she receives 70 back. Determine the type of bias.

A) Nonresponse
B) Response
C) Sampling
D) Undercoverage

2) Determine the sampling technique which is used. At a local technical school, five auto repair classes are randomly selected and all of the students from each class are interviewed. What sampling technique is used?

A) Systematic
B) Stratified
C) Simple random
D) Cluster
E) Convenience

3) The table lists the smoking habits of a group of college students.

Sex	Non-Smoker	Regular Smoker	Heavy Smoker	**Total**
Man	135	51	5	**191**
Woman	187	21	12	**220**
Total	**322**	**72**	**17**	**411**

If a student is chosen at random, find the probability of getting someone who is a man or a heavy smoker. Round your answer to three decimal places.

A) 0.708 B) 0.153 C) 0.256 D) 0.494

4) A doctor at a local hospital is interested in estimating the birth weight of infants. How large a sample must she select if she desires to be 98% confident that the true mean is within 2 ounces of the sample mean? The standard deviation of the birth weights is known to be 8 ounces.

A) 86 B) 87 C) 88 D) 89

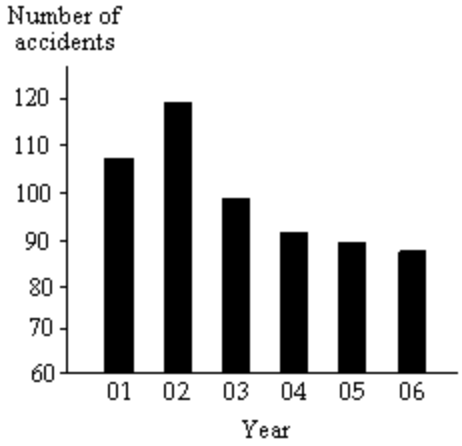
5) In a recent survey, 70% of the community favored building a health center in their neighborhood. If 14 citizens are chosen, find the probability that exactly 6 of them favor the building of the health center.

A) 0.023 B) 0.700 C) 0.126 D) 0.429

6) Suppose that prices of a certain model of new homes are normally distributed with a mean of $150,000. Find the **approximate** percentage of buyers who paid between $148,200 and $151,800 if the standard deviation is $1800.

A) 99.7% B) 95% C) 68% D) 34%

7) The following graph shows the number of car accidents occurring in one city in each of the years 2001 through 2006. How is the bar graph misleading?



A) The vertical axis is manipulated such that differences in bar heights appear **larger** than they really are.
B) The vertical axis is manipulated such that differences in bar heights appear **smaller** than they really are.
C) The horizontal axis is manipulated such that differences in bar heights appear **smaller** than they really are.
D) The horizontal axis is manipulated such that differences in bar heights appear **larger** than they really are.

8) Investing is a game of chance. Suppose there is a 40% chance that a risky stock investment will end up in a total loss of your investment. Because the rewards are so high, you decide to invest in five independent risky stocks. Find the probability that at least one of your five investments becomes a total loss.

A) 0.0102 B) 0.9222 C) 0.0518 D) 0.2590

9) Which is **not** a measure of dispersion?

A) Range
B) Mean
C) Standard deviation
D) Variance

10) **Determine whether the situation depicts an observational study or an experiment.** A researcher obtained a random sample of 100 smokers and a random sample of 100 nonsmokers. After interviewing all 200 participants, the researcher compared the rate of depression among the smokers with the rate of depression among nonsmokers.

A) observational study
B) experiment

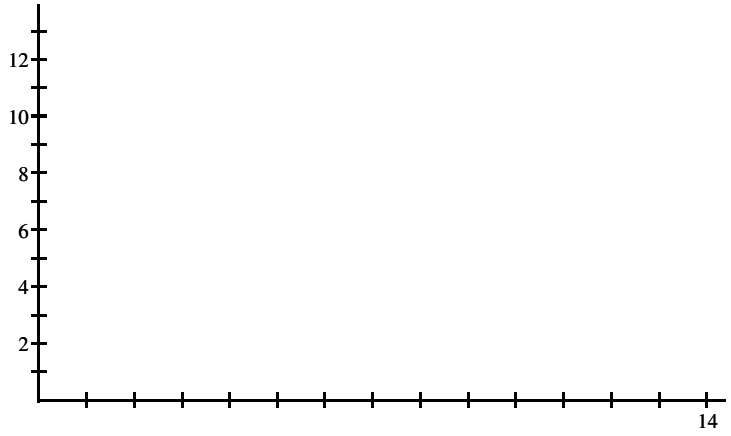
End Part I

Part II

Instructions: Answer all ten questions carefully and completely. Show your work. Clearly indicate your answer. Partial credit may be awarded. Unless otherwise instructed, round answers to two decimal places.

11) Construct the specified histogram. The 30 students in Mrs. Harrison's literature class were asked how many cousins they had. The results are shown below. Create a frequency histogram for the data using 0 as the first lower class limit and a class width of 2. Include appropriate labels.

2	1	3	7	4	7
5	1	0	9	3	1
5	4	1	8	2	11
0	6	3	1	5	7
3	1	1	5	6	0



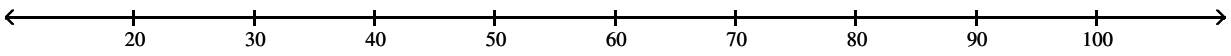
Describe the shape of the distribution. _____

12) The test scores of 30 students are listed below.

21	41	45	48	52	55	56	56	63	65
67	67	69	70	70	74	75	78	79	79
80	81	83	85	85	87	90	92	95	99

Compute the five-number summary. _____ _____ _____ _____ _____

Draw a boxplot that represents the data.



Describe the shape of the distribution. _____

13) In a random sample, 10 employees at a local plant were asked to compute the distance they travel to work to the nearest tenth of a mile. The data are listed below.

1.1 5.2 3.6 5.0 4.8 1.8 2.2 5.2 1.5 0.8

Mean _____ Range _____

Sample Standard Deviation _____

14) A student scores 74 on a geography test and 243 on a mathematics test. The geography test has a mean of 80 and a standard deviation of 5. The mathematics test has a mean of 300 and a standard deviation of 38. If the data for both tests are normally distributed, on which test did the student score better relative to the other students in each class? Show your work.

15) The data below are the average one-way commute times (in minutes) for selected students and the number of absences for those students during the term.

Commute time (min), x	72	85	91	90	88	98	75	100	80
Number of absences, y	3	7	10	10	8	15	4	15	5

Write the equation of the regression line for the given data.

_____

What would be the predicted number of absences if the commute time were 95 minutes? Round the predicted number of absences to the nearest whole number. Show your work.

_____

Linear Correlation Coefficient _____(3 decimal places)

Critical Value _____

Is there a significant linear relation between commute time and number of absences?

_____ Explain:

16) **Claim**: The mean cost of textbooks for one class is greater than $160.
H_0 : $\mu = \$160$
H_1 : $\mu > \$160$

In terms of this situation, explain a type I error.

In terms of this situation, explain a type II error.

17) Construct a 95% confidence interval for the population mean, μ. Assume the population has a normal distribution. A sample of 25 randomly selected English majors has a mean test score of 81.5 with a standard deviation of 10.2.

Calculate the margin of error. Show your work.

_____

State the interval. Show your work.

_____

Interpret your result.

18) An article in a Florida newspaper reported on the topics that teenagers most want to discuss with their parents. The results of a poll showed that 46% would like more discussion about the family's financial situation, 37% would like to talk about school, and 30% would like to talk about religion. These and other percentages were based on a national random sampling of 536 teenagers. Estimate the proportion of all teenagers who want more family discussions about school by constructing a confidence interval. Use a 90% confidence level.

Calculate the margin of error. Show your work.

_____

State the interval. Show your work.

_____

Interpret your result.

19) A manufacturer claims that the mean lifetime of its lithium batteries is 1000 hours. A homeowner thinks it may different from 1000 hours. He randomly selects 36 of these batteries and finds the mean lifetime to be 970 hours with a standard deviation of 80 hours. Test the manufacturer's claim. Use $\alpha = 0.05$.

Method used: **Classical** or **P-Value** (Circle one)

Null Hypothesis:

Alternative Hypothesis:

Test Statistic:

Critical Value(s) or P-Value (Circle one)

Conclusion about the Null Hypothesis:

Conclusion Addressing the Original Claim:

20) The engineering school at a major university claims that more than 20% of its graduates are women. In a randomly selected graduating class, of the 210 students, 49 were females. Does this suggest that the school's claim is believable? Use $\alpha = 0.05$. Give a detailed argument. Show all the steps.