**Quantitative Methods Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
Midterm Exam Spring 2013, Aaron Hill**

*Instructions: Answer the following questions thoroughly, and remember to describe and interpret your results. Include relevant information about your assumptions, methods or tests used, calculations, and interpretations. Remember to show all of your work; attach extra pages as needed. All problems use fictitious data examples and do not represent actual research.*

**SECTION ONE***Computation and interpretation (three questions, 10 points each)*

1. For air travelers, one of the biggest complaints is of the waiting time between when the airplane taxis away from the terminal until the flight takes off. Suppose 100 flights have been randomly sampled. The waiting time in the sample has a skewed-right distribution with a mean of 10 minutes and a standard deviation of 8 minutes. What are the properties of the sampling distribution and population estimate for waiting time between when the airplane taxis away from the terminal until the flight takes off?

Recall that the standard error is estimated with:

Choose the best answer, and briefly describe how you arrived at this answer.

1. The sampling distribution is approximately normal with mean population estimate = 10 minutes and standard error = 0.8 minutes.
2. The sampling distribution is skewed-right with mean population estimate = 10 minutes and standard error = 8 minutes.
3. The sampling distribution is skewed-right with mean population estimate = 10 minutes and standard error = 0.8 minutes.
4. The sampling distribution is approximately normal with mean population estimate = 10 minutes and standard error = 8 minutes.
5. At rush hour, the average length of time between swiping your Metrocard and the arrival of a train is 3.5 minutes with a standard deviation of one minute. What is the probability of a train arriving in three minutes or less? Assume that the distribution of train arrivals is normal.
6. Consider the following raw results from a random-sample survey for the question, “Did you vote in the most recent national election?”:

|  |  |
| --- | --- |
| **Response** | **N** |
| Yes, and I normally vote in most elections. | 94 |
| Yes, but I don’t normally vote in most elections. | 51 |
| No, and I don’t normally vote in most elections. | 22 |
| No, but I normally vote in most elections. | 107 |
| **Total** | **274** |

At the 95% level of confidence, estimate the proportion of the population that voted in the most recent national election.

**SECTION TWO***Essay (20 points)*

1. Researchers rarely have data on the full population that they are studying. In order to learn about their population, they draw a sample from it in order to infer meaning about the entire population. However, this inference is only permissible and/or credible under certain circumstances. What are these circumstances? What are the mechanisms by which these inferences are possible? What statistical principles and theories underlie these mechanisms? *In detail*, list, describe, define, and explain the process by which statistical inference is made.

**SECTION THREE***Short answer (50 points)*

Circle the *best* answer. (3 points each)

1. One out of three people like squirrels. What is the probability that two people selected randomly from the population *both* like squirrels?
   1. 0.33
   2. 0.66
   3. 0.11
   4. 0.17
2. For some positive value of Z, the probability that a normally distributed variable is between Z=0 and Z is 0.377. The value of Z is:
   1. 0.34
   2. 1.16
   3. 1.78
   4. 0.09
3. If you wanted to test the difference between a sample mean and a known population, you would use:
   1. a two sample hypothesis test
   2. a two tailed test
   3. a one sample hypothesis test
   4. a one tailed test
4. If the mean is less than the median, you have \_\_\_\_\_\_\_ skew.
   1. positive
   2. negative
   3. no
   4. severe
5. The standard deviation of [3, 6, 11] is:
   1. 6.67
   2. 32.67
   3. 16.33
   4. 4.04
6. In inferential statistics, the theoretical mechanism that links the sample statistic and the population estimate:
   1. mean
   2. standard error
   3. sampling distribution
   4. normal curve
7. When is p = 0? *(p is the same as “Sig.” in SPSS output)*
   1. when the probability that your statistic doesn’t represent the population is 0
   2. when Z-obtained is astronomically high
   3. when alpha = 0.001
   4. never
8. The range of the middle 50% of the distribution is the:
   1. range
   2. interquartile range
   3. median
   4. the difference between the median and the mean
9. A descriptive statistic that shows the number of cases in one category divided by the number of cases in some other category.
   1. proportion
   2. percentage
   3. ratio
   4. percentage change
10. If I were going to conduct a survey on doctor visits at a specific medical center, and my plan is to survey every 10th person that enters the medical center, which sampling technique is being used?:
    1. simple random sample
    2. systematic sample
    3. cluster sample
    4. stratified sample
11. The normal distribution:
    1. has a mean of 0 and a standard deviation of 1.
    2. has an area equal to 0.5.
    3. has a mean of 1 and a variance of 0.
    4. requires that N must be greater than or equal to 100.
12. Of the following choices, which is the *best* graph for visualizing the variable “number of pies eaten at the pie eating competition?” Assume that several thousand people entered the competition, with quite a lot of variance in appetite.

* 1. pie chart
  2. three dimensional pie chart
  3. histogram
  4. frequency table

1. Which measure of dispersion takes into account every observation in its computation?:
   1. range
   2. interquartile range
   3. min and max
   4. standard deviation
2. If you wanted to test the difference in satisfaction with life (an interval-ratio scale) between those who watch the television show *RuPaul’s Drag Race* and those who do not, what is the best approach?
   1. compute two estimation procedures (of proportions) and compare the results
   2. compute two estimation procedures (of means) and compare the results
   3. conduct a one sample hypothesis test
   4. conduct a two sample hypothesis test
3. For a variable X, with a mean of 35,000 and a standard deviation of 200, drawn from a random sample with 500 observations, what is the probability that the true population mean is between 34,977 and 35,023?
   1. 0.01
   2. 0.05
   3. 0.95
   4. 0.99

List the level of measurement of each of the following variables. *(1 pt each)*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Number of books owned

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Genre of book

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Color of book

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Number of pages in book

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Size of book (small, medium, or large)