**Quantitative Methods Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
Midterm Exam Summer 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*

1. Recall the following equations for computing a large, two-sample hypothesis test:

|  |  |
| --- | --- |
|  |  |

1.1. Which inputs to these equations contribute to the result of the test for statistical significance? *(5 points)*

1. margin of error, variance, and confidence interval
2. means difference between x1 and x2, variance, and sample size
3. margin of error, standard deviation, and sample size
4. standard deviation, sample size, and the sampling distribution

1.2. As the means difference between x1 and x2 increases, Z*(obtained)* \_\_\_\_\_\_\_\_\_\_ and the likelihood of finding statistical significance \_\_\_\_\_\_\_\_\_\_. *(5 points)*

1. increases, increases
2. increases, decreases
3. decreases, decreases
4. decreases, increases

1.3. As the variance increases, \_\_\_\_\_\_\_\_\_\_, Z*(obtained)* \_\_\_\_\_\_\_\_\_\_ and the likelihood of finding statistical significance \_\_\_\_\_\_\_\_\_\_. *(5 points)*

1. increases, increases, increases
2. increases, increases, decreases
3. increases, decreases, decreases
4. decreases, decreases, decreases
5. decreases, decreases, increases
6. decreases, increases, increases

1.4. As the sample size increases, \_\_\_\_\_\_\_\_\_\_, Z*(obtained)* \_\_\_\_\_\_\_\_\_\_ and the likelihood of finding statistical significance \_\_\_\_\_\_\_\_\_\_. *(5 points)*

1. increases, increases, increases
2. increases, increases, decreases
3. increases, decreases, decreases
4. decreases, decreases, decreases
5. decreases, decreases, increases
6. decreases, increases, increases

2) The average interest rate offered on savings accounts in the U.S. is 0.50% and is normally distributed. The standard deviation is 0.20%. What is the probability that you could get an interest rate greater than 1% on a savings account in the U.S.? *(10 points)*

3) The European Commission conducted a random-sample survey of 694 European Union citizens from 25 countries. It found that 389 of those surveyed can hold a conversation in one language apart from their mother tongue. At a 90% level of confidence, estimate the population proportion of those in the EU who can converse in a non-native language. *(10 points)*

4) The American Time Use Survey—a random-sample survey (N=12,443) conducted by the Bureau of Labor Statistics—found that Americans spend an average of 2.8 hours a day watching television (s=3.33). At a 99% level of confidence, estimate the average number of hours of television watched each day for the U.S. population. *(10 points)*

**SECTION TWO, ESSAY**: 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. *(20 points)*

**SECTION THREE***Multiple choice (30 points)*

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

1. If you wanted to test the difference in means between two groups in a random sample, 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
2. The standard deviation of [1, 9, 11] is:
   1. 4.32
   2. 5.29
   3. 7
   4. 18.67
3. If you rolled five dice, what is the probability that you would roll all ones?
   1. 0.166667
   2. 0.004630
   3. 0.000772
   4. 0.000129
4. How can you check for skew?

* 1. compare the mean to the median
  2. interpret the standard deviation
  3. interpret a histogram
  4. all of the above

1. In inferential statistics, the theoretical mechanism that links the sample statistic and the population estimate:
   1. sampling distribution
   2. mean
   3. Z score
   4. normal curve
2. Why can p never be equal to 0? *(p is the same as “Sig.” in SPSS output)*
   1. because a p value of 0 or 1 would indicate certainty, not probability
   2. because you can’t divide by zero when making computations
   3. because Z is equal to 0 in the middle of the distribution
   4. because you can’t take the square root of 0
3. When is the sampling distribution normally distributed?

* 1. when the dependent variable is normally distributed
  2. when the independent variable is normally distributed
  3. when both the dependent and independent variables are normally distributed
  4. when the sample is random

1. Which Z score would correspond with an alpha of 0.25?:

* 1. 0.69
  2. 1.15
  3. 1.16
  4. 2.24

1. The second step (of the five steps) of the Hypothesis Testing process is:
   1. Compute the statistic
   2. Decide which test to use and state your assumptions
   3. Set alpha
   4. State the null and research hypotheses
2. If you say something is statistically significant but there isn’t really an effect in the population, you have committed which type of error?:
   1. margin of error
   2. standard error
   3. Type I error
   4. Type II error