ID# ____________________ Exam 1 PS 217, Fall 2010

Read each question carefully and answer it completely. Show all your work. Think of the point value for each question as an index of the time it should take to complete your answer. Thus, if you spend 20 minutes on a 10-point question, you may not be able to complete the exam. As always, the Skidmore Honor Code is in effect, so I will ask you to indicate your adherence to the Code at the end of the exam. Good Luck!

1. The Central Limit Theorem provides us with important information about the sampling distribution of the mean. [3 pts]

a. its mean (μ_M) will be	
b. its standard deviation (σ_M) will be	
c. its shape will be normal if	

2. Provide a brief answer to each of the following questions. (No real computation necessary) [12 pts]

Question	Answer
a. Suppose that you are dealing with an effect size (e.g., *d*) that is considered to be small. If you were interested in testing such an effect (e.g., using a *t*-test), what might you do to ensure that you found a significant effect (i.e., were able to reject H_0)?	
b. If you reject H_0, what is the probability of making a Type II error?	
c. What is another name for the standard deviation of the sampling distribution of the mean?	
d. What is the typical probability of making a Type I Error (α)?	
e. Suppose that a sample standard deviation (*s*) is 10. Next, suppose that you add 5 to every score in the sample. What would the standard deviation of the sample now be?	
f. Suppose that a sample standard deviation (*s*) is 10. Next, suppose that you convert every score in the sample to a *z*-score. What would the standard deviation of this distribution now be?	
g. $\Sigma(X - \mu) =$	
h. Suppose that you are computing a *t*-test with $t_{Crit} = 1.96$. What can you tell me about that *t*-distribution?	
i. In a negatively skewed distribution, which is larger, the median or the mean?	
j. Suppose that the mean of a sample of $n = 25$ is $M = 5$. Generally speaking, if you add another score (new $n = 26$), the *SS* of the sample would increase. However, there is one score you could add to the sample without increasing its *SS*. What is that score?	
k. Researchers typically hope to achieve power of roughly .80. Essentially, in so doing, what Type II error rate are they saying that they are willing to tolerate?	
l. When might the median be a better measure of central tendency than the mean?	

3. Answer the following questions assuming that they are dealing with a population of IQ scores, which are normally distributed with $\mu = 100$ and $\sigma = 15$.

a. What is the probability that a person has an IQ score between 120 and 140? [3 pts]

b. What is the probability that a person has an IQ score between 90 and 115? [3 pts]

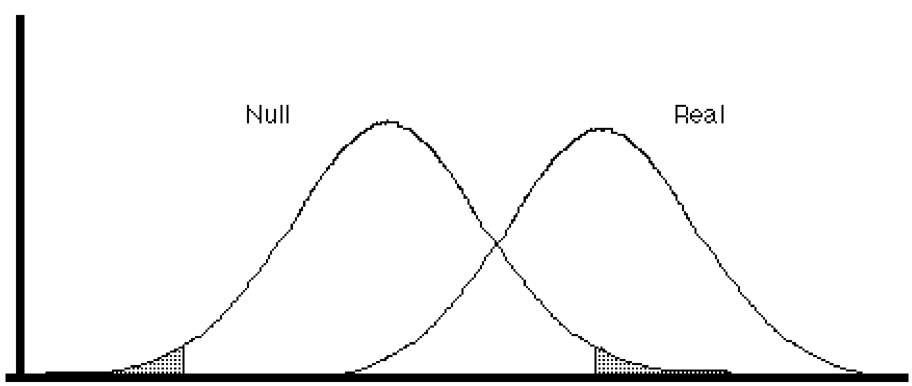
c. What IQ scores would be achieved by the lower 75% of the population? [3 pts]

d. What IQ scores would be achieved by the upper 5% of the population? [3 pts]

e. What is the probability that a sample of $n = 25$ would yield a mean (M) IQ of 103 or less from this population? [4 pts]

f. For samples of $n = 100$, what mean IQ scores would comprise the middle 90% of the sampling distribution of the mean? [4 pts]

4. On the curves seen below, label the areas that represent Type I Errors, Type II Errors, Power, and Correct "Retention." [5 pts]



5. You should recognize the SPSS output below from our last lab. Interpret the results as completely as you can. That is, what is the score of interest, what would H_0 and H_1 be, what is the *t*-test and what decision and conclusion would you reach? [5 pts]

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
MPH 00-10	10	152.48520	9.071285	2.868592

One-Sample Test

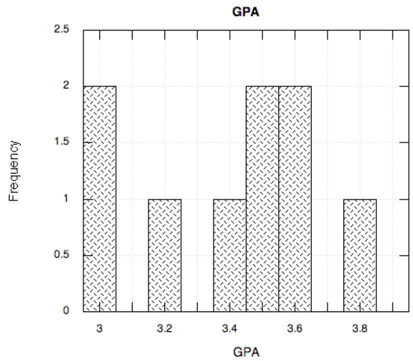
	Test Value = 160					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
MPH 00-10	-2.620	9	.028	-7.514800	-14.00401	-1.02559

6. Below is another SPSS output. Using the information in the output table, test H_0: $\mu = 9$. [10 pts]

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
QuizScore	26	5.00	10.00	8.7308	1.53773
Valid N (listwise)	26				

7a. Below is a sample of GPAs. ***Estimate*** μ, σ^2, and σ of the population from which the sample was drawn. [10 pts]



7b. Given the above data, could you compute a *z*-score to test H_0: $\mu = 3.2$? Why or why not? [2 pts]

8. If you were interested in estimating σ^2 for some (typically large) population, what would you do? [3 pts]