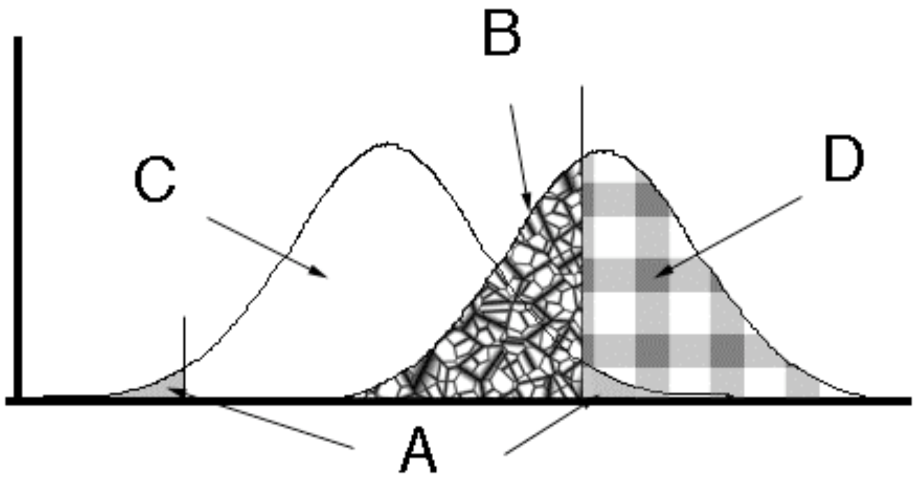
ID# ____________________ Exam 1 PS 217, Spring 2009

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. Label the graph below appropriately:



The distribution on the left represents H_0 True. The distribution on the right represents H_0 not true. So, in terms of hypothesis testing, what do A, B, C, and D represent? [2 pts]

Letter	Label	Letter	Label
A		C	
B		D	

2. You should recognize a few similarities between the curves in hypothesis testing (as above) and the curves in a signal detection paradigm. Indicate three similarities below: [3 pts]

In Hypothesis Testing Terms	In Signal Detection Terms
	d’
	Hits
	Misses
	False Alarms
	Criterion

3. Given that SAT math scores are normally distributed with $\mu = 500$ and $\sigma = 100$, answer the following questions: [10 pts]

a. If all the SAT math scores were transformed to *z*-scores, the distribution of *z*-scores would have parameters as follows (fill in the box below each parameter):

μ	σ

b. What proportion (or percentage) of people would have SAT math scores between 600 and 700?

c. What SAT math scores would determine the middle 50% of the distribution? (In other words, 25% above and 25% below the mean.)

d. What proportion of groups of 25 students taking the SAT-M exam would have a mean greater than 600?

4. Suppose that you take a sample of n = 16 students and determine the GPA for each of them, as seen below:

	GPA	GPA^2
	3.5	12.25
	3.0	9.0
	3.8	14.44
	2.9	8.41
	2.5	6.25
	3.5	12.25
	3.1	9.61
	3.0	9.0
	2.9	8.41
	3.4	11.56
	3.5	12.25
	2.1	4.41
	3.4	11.56
	3.8	14.44
	3.2	10.24
	2.7	7.29
Sum	50.3	161.37

a. Estimate the parameters of the population from which the sample was drawn. [5 pts]

b. Educators often talk about grade inflation. Suppose that the mean GPA in 1960 was 2.6 (i.e., μ = 2.6). How likely is it that the sample above (problem 4) was drawn from a population with μ = 2.6? What might this evidence say about grade inflation? [10 pts]

5. Miscellaneous questions

a. Define the term *standard error*, both in a formula and in words that talk about its distribution. [2 pts]

b. Under which conditions is the median the preferred measure of central tendency? [1 pt]

c. If you were to add a constant to all the scores in a sample, what would happen to the sample variance? [1 pt]

d. Why is the *SS* not a good measure of variability? [1 pt]

e. In a positively skewed population, with $\mu = 85$ and $\sigma = 10$, what percentage of scores would be above 85? [1 pt]

f. What does the Central Limit Theorem tell you about the nature of the sampling distribution of the mean as sample size increases? [2 pts]

g. Suppose that you are computing a *t*-test with $t_{Crit} = 1.96$. What can you tell me about that *t*-distribution? [1 pt]

h. In the above situation (question 5g), if your *t* statistic came out as 1.94, what would you decide and what would you do next? [1 pt]

i. In NHST, the probability of making a Type I Error is typically set to ☐ %. [1 pt]

j. Interpret the SPSS output below as completely as you can. (In other words, what is the statistic, what are the scores, how would you interpret the results, etc.) [4pts]

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
IQ	22	131.2273	9.22694	1.96719

One-Sample Test

	Test Value = 120					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
IQ	5.707	21	.000	11.22727	7.1363	15.3183

k. In a short sentence, define power (1 – β). Then, tell me a strategy for making your statistic more powerful…being careful to articulate how that strategy works. [5 pts]