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Exam 1

PS 217, Spring 2003

OK, here's your first exam. The Skidmore Honor Code is in effect, so adhere to it scrupulously. Work through the problems as quickly as you can while maintaining accuracy. Show all your work, otherwise I cannot give you partial credit. Use the point values of each question as a guideline to the approximate time needed to answer the question (1 point = 1 minute). Good luck!

1. 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):

$\mu$	$\sigma$

b. If a person achieved an SAT math score of 535, what proportion (or percentage) of people would have higher SAT math scores?

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 (or percentage) of people would have SAT math scores between 550 and 650?

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

	GPA	GPA <sup>2</sup>
	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. Test the hypothesis that the sample was drawn from a population with  $\mu = 3.0$ . [10 pts]

3. In the context of signal detection theory in the lab on z-scores, you learned about the possible outcomes of trials, as seen below: [5 pts]

		Type of Trial	
		Noise Only	Signal + Noise
Participant Reports	Signal Present	False Alarm	Hit
	No Signal Present	Correct Rejection	Miss

It should strike you that this table is very similar to the table used to illustrate the possibilities of decisions in hypothesis testing (e.g., Type I error, Type II error). Set up the table below so that it mirrors the table above in terms of  $H_0$ , etc.

		Actual Situation	
Experimenter's Decision			

4. As you saw in that lab, you can use z-scores to determine a measure of sensitivity ( $d'$ ). Suppose that on a recognition memory test, a person got 80% hits and 10% false alarms. What  $d'$  would that person receive? [5 pts]

5. As you know, IQ scores are normally distributed with  $\mu = 100$  and  $\sigma = 15$ . Use that information to address the following questions. [10 pts]

a. What proportion (or percentage) of people have IQ scores between 100 and 115?

b. If you took a sample of  $n = 25$ , what proportion (or percentage) of such samples would have means between 100 and 115?

c. Briefly explain why you might have gotten a different answer for  $a$  and  $b$  above.

6. A sample of  $n = 36$  quiz scores were obtained from a statistics class. The StatView analysis conducted on these data is seen below. [5 pts]

**One Sample t-test**

**Hypothesized Mean = 8**

	Mean	DF	t-Value	P-Value
Quiz Scores	8.222	35	.732	.4692

a. State the null and alternative hypothesis.

b. What should you conclude about  $H_0$ ?

c. What would you say about the power of this analysis?