

As always, the Skidmore Honor Code is in effect. At the end of the exam, you'll write the Honor Code and sign it to attest to your adherence. It's very important that you show all your work, otherwise I won't be able to give you partial credit, should you arrive at a wrong answer. Keep in mind that the point-value of a question is a cue to the time it should take you to answer the question. Thus, you shouldn't work much more than 10 minutes on a 10-point question, otherwise you won't finish the exam. Good Luck!

[This page is worth 10 points.]

1. What is another name for the standard deviation of the sampling distribution of the mean?

2. The distribution of family incomes in the U.S. is positively skewed. Suppose that you were to convert all of those incomes into  $z$ -scores. How would you describe that  $z$ -score distribution in terms of:

mean	standard deviation	shape

3. In the last lab, we talked about how one might test hypotheses using single-sample  $t$ -tests. For which data set did we test  $H_0: \mu = 200$  kg?

4. In the lab for  $z$ -scores, we looked at how  $z$ -scores were intrinsic to signal detection theory. The specific application of signal detection theory was a recognition memory experiment. In such an experiment, what would  $d'$  indicate?

5. If you were interested in estimating  $\sigma^2$  for some (typically large) population, what would you do?

6. Given what you know about hypothesis testing, you should see a connection to the legal system. For instance, the notion of "innocent until proven guilty" means that the null hypothesis in the courtroom is "defendant is not guilty." Michael Jackson was found "not guilty" in his trial. In null hypothesis significance testing terms, in what two ways might you explain that verdict?

7. If you think of IQ scores as normally distributed with  $\mu = 100$  and  $\sigma = 15$ , you should be able to answer the following questions: [3 pts each]

a. What proportion of IQ scores would fall between 120 and 130?

b. What proportion of IQ scores would fall below 110?

c. If you wanted to consider yourself smarter than 95% of people, what IQ score would you need to earn?

d. If you administered an IQ test to a random sample of  $n = 25$  people, what is the probability that their mean IQ would be greater than 109?

e. If you were about to take a random sample of  $n = 25$  people and you wanted to estimate the mean IQ of the sample, you might consider that it should fall in the middle 95% of the distribution. Thus, their mean would likely fall between what two scores?

8. I never know how a population of statistics students might perform on one of the quizzes I construct. However, I could think of the performance of students in my course as a non-random sample of quiz scores. Suppose that on a recent quiz, students produced the following scores:

9
7
8
7
6
9
10
9
8

Calculate the mean, variance, and standard deviation of this sample. [8 pts]

9. Test the hypothesis that the above quiz scores were randomly sampled from a population with  $\mu = 9.5$ . [10 pts]

10. What would you estimate the effect size to be in the above example? [2 pts]

11. For the following StatView analysis of a set of quiz scores, tell me  $H_0$ , sample size ( $n$ ), and how you would interpret the results. [5 pts]

**One Sample t-test**  
**Hypothesized Mean = 9**

	Mean	DF	t-Value	P-Value
Quiz Scores	8.100	19	-2.714	.0138

12. 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  $H_0$ )? [2 pts]

13. If you reject  $H_0$ , what is the probability of making a Type II error? [1 pt]

14. Under which circumstances would you be able to test a null hypothesis using a  $z$ -score? [1 pt]

15. Given that we typically think of an experimental effect as an additive constant, it's important to understand the implications of adding a constant to all the scores in a distribution. Suppose that the sample had a mean of 10 and variance of 3. If we added a constant of 5 to all the scores in the sample, what would be the mean and variance of the new sample? [1 pt]

16. What are the names of the authors of your textbook? ☺