

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!

On this page, questions are worth 1 point.

1. If you were to add a constant to all the scores in a sample, what would happen to the sample variance?
2. The null hypothesis
 - a. predicts that the treatment will have an effect
 - b. is denoted by the symbol H_1
 - c. is always stated in terms of population parameters
 - d. all of the above
3. Holding everything else constant, increasing sample size
 - a. decreases standard error
 - b. increases the magnitude of the t statistic
 - c. increases degrees of freedom
 - d. all of the above
4. A population with $\mu = 48$ and $\sigma = 12$ is transformed into a new population with $\mu = 100$ and $\sigma = 20$. What is the value in the new distribution for a score of $X = 54$ from the original population?
 - a. 106
 - b. 110
 - c. 120
 - d. 160
5. The value of α is determined by
 - a. the size of the sample (n)
 - b. the magnitude of the treatment effect
 - c. α is selected by the researcher or researchers in the discipline
 - d. the standard deviation of the scores
6. For the sample of five scores below, compute the appropriate measure of central tendency.

100, 101, 102, 104, 10000
7. Suppose that you are computing a t -test with $t_{\text{crit}} = 1.96$. What can you tell me about that t -distribution?
8. Suppose that for a sample of $n = 25$, $\bar{X} = 5$. Generally speaking, if you add another score (new $n = 26$), the variability of the sample (s^2 or s) would increase. However, there is one score you could add to the sample without increasing its variability. What would that score be?
9. If you are looking for a small effect (low d), what would you need in order to be able to reject H_0 ?
10. Suppose that you knew that the probability of a Type II Error in your study was .40, what level of power would you have in that study?

11. You are dealing with a negatively skewed distribution. [5 pts]

a. First, sketch what a negatively skewed distribution look like:

b. Which score is smaller (lower), the mean or the mode?

c. Which score is smaller (lower), the median or the mode?

You next convert all the scores in this negatively skewed distribution to z -scores.

d. What is the mean of this distribution of z -scores?

e. What is the standard deviation of this distribution of z -scores?

f. What would be the shape of the distribution of z -scores?

12. What is α ? [1 pt]

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

14. 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.” Amanda Knox was found “not guilty” in her trial appealing her original guilty verdict. In null hypothesis significance testing terms, in what *two* ways might you explain that verdict? [2 pts]

15. Suppose that during impersonal social interactions (that is, with business or casual acquaintances) people in the United States maintain a mean social distance of $\mu = 3$ feet from the other individual. This distribution is normal and has $\sigma = 1.5$. Use that information to answer the following questions. [10 pts]

a. What is the probability that impersonal social interactions in the U.S. would take place between 3.5 and 6 feet?

b. What two interpersonal distances determine the middle 60% of impersonal interaction distances in the population?

c. What is the probability of drawing a sample of $n = 25$ people and finding a mean impersonal social interaction distance of more than 3.6 feet?

d. A researcher examines wants to examine whether or not this finding is true for other cultures. A random sample of $n = 9$ people of Middle Eastern culture is observed in an impersonal interaction. For this sample, the mean distance is 2.0 feet ($\bar{X} = 2.0$). Test the hypothesis that the Middle Eastern sample was drawn from a population like that in the U.S. (normally distributed with $\mu = 3$ and $\sigma = 1.5$).

e. What kind of error might you be making in your decision above in d ? Why?

16a. Dr. Seymour Statz is interested in the measuring reaction times (RTs) for people who are asked to press a button upon detecting a target. These RTs are measured in milliseconds (msecs, one-thousandths of a second). Suppose that Dr. Statz was interested in the impact of aging on reaction time, so he collected a sample of nine people ($n = 9$) all of whom were between 75 and 80 years of age. First, estimate the typical populations parameters for central tendency and variability. (To aid you in your computations, I've provided ΣX and ΣX^2 .) [5 pts]

	RT (X)	RT ² (X ²)
	480	230400
	500	250000
	460	211600
	490	240100
	610	372100
	730	532900
	590	348100
	540	291600
	530	280900
Sum	4930	2757700

16b. Next, assume that for the entire population of people, these reaction times are normally distributed with a mean (μ) of 450 msec. Show Dr. Statz how you could use the sample data above to determine whether or not older people have reaction times that are consistent with the entire population. [5 pts]

17. In a subsequent study looking at a different question, Dr. Statz obtained the following output. Tell me all that you can about the study (e.g., number of participants, H_0 , etc.), what Dr. Statz should conclude, etc. [5 pts]

T-Test

[DataSet0]

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
RT	16	471.0000	60.04221	15.01055

One-Sample Test

	Test Value = 500					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
RT	-1.932	15	.072	-29.00000	-60.9942	2.9942

18. What effect size would the above results produce? [2 pts]

19. 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? In NHST (Null Hypothesis Significance Testing) terms, what is d' most like? [2 pts]

20. A parameter is always indicated by what kind of letter? [1 pt]