

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. For the following questions, only a simple answer is required...and no computation should be needed. [5 pts]

a. $\Sigma(X - \mu) =$

b. Suppose that a sample standard deviation (s) is 10. Next, suppose that you add 5 to every score in the sample. The standard deviation of the sample would now be:

c. Suppose that a sample standard deviation (s) is 10. Next, suppose that you convert every score in the sample to a z -score. The standard deviation of this distribution would be:

d. 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 . That would be

e. Researchers typically hope to achieve power of roughly .80. Essentially, in so doing, they are saying that they are willing to tolerate a Type II error rate of %.

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

a. What proportion (or percentage) of people would have SAT-M scores between 550 and 650?

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

c. What proportion of groups of 25 students taking the SAT-M exam would have a mean greater than 400?

d. Suppose that you wanted to translate individual SAT-M scores into a distribution with $\mu = 10$ and $\sigma = 1$. Under this new scoring system, what would an "old" SAT-M score of 600 translate into?

3. Suppose that you take a random sample of $n = 9$ students on their way to an 8AM class in TLC and ask them for their GPAs. Their data are seen below. What is your best estimate of the μ and σ for the population from which this sample was drawn? [10 pts]

	GPA	GPA ²
	3.5	12.25
	3.0	9.00
	3.8	14.44
	2.9	8.41
	3.7	13.69
	3.5	12.25
	3.1	9.61
	3.0	9.00
	3.2	10.24
Sum	29.7	98.89

4. Given the sample of GPAs obtained above, and assuming a normal distribution of GPAs, how likely is it that your sample was drawn from a population with $\mu = 3.3$? [10 pts]

5. More miscellaneous questions

a. In a positively skewed distribution, what is the relationship between the mode, median, and mean? [2 pts]

b. In class, we talked about the poor woman who was pregnant in San Diego. She argued that she had a *very* long gestation period (~308 days!!!). Essentially, she is claiming that her gestation period was sampled from the normal population ($\mu = 268$ days and $\sigma = 16$ days). When faced with a situation such as this, a statistician has to make a decision. Given her gestation period, what decision would you make? Why? What kind of error might you be making with that decision? [3 pts]

c. As the sample size approaches infinity, what happens to the value of t_{Critical} and why? [2 pts]

d. Interpret the PASW 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.) [3 pts]

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
IQ	23	123.3478	24.96836	5.20626

One-Sample Test

	Test Value = 115					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
IQ	1.603	22	.123	8.34783	-2.4493	19.1450

6. When I asked about a way to detect a small effect size, Emily Bruschi answered that you would need a large sample size (n). If you recall, I responded that her response was sort of correct, but that she had skipped a step. That is, in order to detect a small effect size, you need to have more *something* (which might be achieved by a larger n). What is *something*? And how is it that Emily's response would actually lead one to better detect a small effect size (by providing more *something*)? (A rough figure might help to explain your answer.) [5 pts]