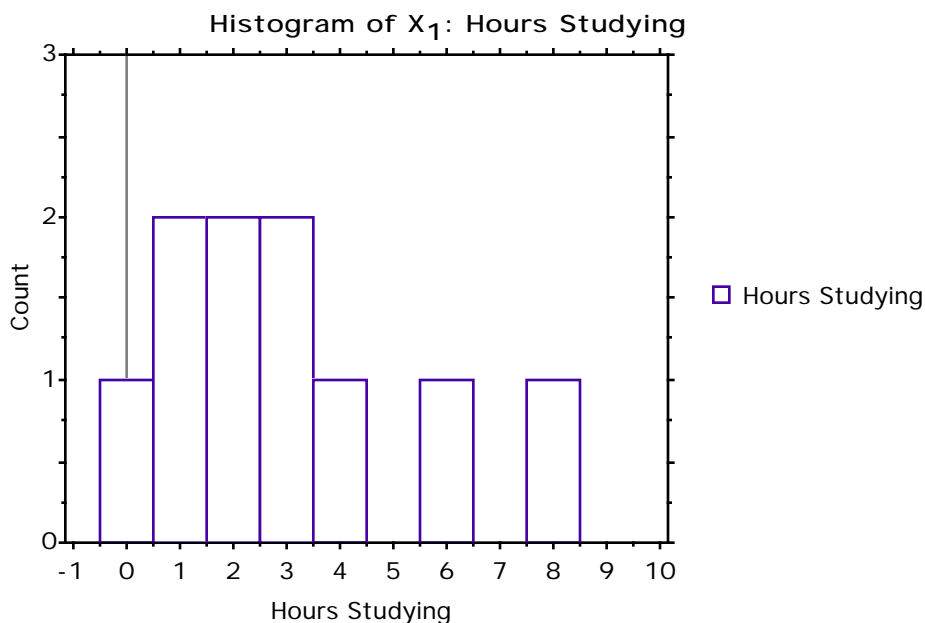


Read the questions carefully. Answer each question neatly and completely, **showing all of your work**. The point value of each question is a rough indicator of the number of minutes that I think the question should take you to complete, so if you find yourself taking an inordinate amount of time on any one question, you should probably move on to the next question. Be sure to state your null and alternative hypotheses, where appropriate, and to tell me what decision you would reach in each question. Obviously, at no point in the exam should you look at any exam other than your own. The Skidmore Honor Code is in effect, and I will have you sign a sheet as you turn in your exam. Good luck on the exam! Now relax, take a deep breath, and begin working.

1. Suppose that you are interested in the number of hours that a person spends studying in a course (statistics, for instance). You question the students in a particular class about the number of hours spent studying in a typical week and obtain the results shown below.
 - a. Use your typical estimation procedures to make inferences about the parameters of the population from which this sample is likely to have been drawn. [10 pts]



1b. Test the hypothesis that the above sample mean was drawn from a normally distributed population with $\mu = 5$ and $\sigma = 3$. [5 pts]

1c. Test the hypothesis that the above sample mean was drawn from a normally distributed population with $\mu = 5$ and $\sigma = 6$. [5 pts]

1d. Explain why you might have reached a different conclusion in 1b and 1c. [2 pts]

2. What is the general formula for all standard scores? [2 pts]

3. What does the Central Limit Theorem tell us about the sampling distribution of means. [2 pts.]

4. Why is the sum of squares (SS) not a good measure of variability? [2 pts.]

5. When might the median be a better measure of central tendency than the mean? [2 pt.]

6. As we saw in class, human gestation periods are normally distributed with $\mu = 268$ days and $\sigma = 16$ days.

a. Suppose that a woman was interested in getting the whole thing over with fairly quickly. She would also like to avoid having a baby that's really premature. Suppose that she's interested in the probability that her gestation period might fall between 244 and 252 days. What would you tell her? [5 pts]

b. Suppose that she wonders what the gestation period might be for the briefest 35% of women (again, hoping that she might fall somewhere within this group). What gestation period cuts off the lowest 35% of gestation periods? [5 pts]

c. Suppose that this woman is in a natural-birth class of 16 pregnant women. What is the probability that the mean gestation period of this class would fall between 244 and 252 days? [5 pts]

7. 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 that her gestation period would yield a z-score of 2.5, what decision would you make? Why? What kind of error might you be making with that decision? Why is it that you can never make a Type I Error *and* a Type II Error on the same decision? [5 pts]