

## 7.2.1: Exercises

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1. The length of time students needed in order to complete a criminal justice test follows a distribution that is approximately normal. The mean length of time students take to complete the criminal justice test is 68 minutes. Barbara finds a random sample of 10 criminal justice students and records their test taking times:  $A = [73.1, 70.4, 68.7, 72.9, 76.7, 78.2, 73.2, 70.2, 64.8, 66.7]$

a. Compute the sample mean and sample standard deviation (rounded to three decimal places) using desmos:

$$\bar{x} = \text{mean}(A) = \text{_____} \text{ minutes}$$

$$s = \text{stdev}(A) = \text{_____} \text{ minutes}$$

b. Is the sampling distribution of sample means approximately normal? Explain why or why not.

c. Which distribution is more appropriate to use to compute probabilities about the sample mean? Justify your selection. If the T-distribution is more appropriate, compute the degrees of freedom.

i. The standard normal distribution

ii. The T-distribution

d. Compute the test statistic for the sample mean of A. Round to two decimal places.

e. Is the sample mean unusual? Explain why or why not.

f. Find the probability of observing a sample mean this high or higher. Round to four decimal places.

g. A criminal justice teacher wants their class to be in the fastest 5% of students' mean length of time to take the criminal justice test. Find the maximum length of time the classes average can be.

2. Franklin wants to know the average female baby birth length in his city. He randomly selects 65 female babies and records their birth length. He finds that the sample mean is 18.8 inches and the sample standard deviation is 0.063 inches.
- Is the sampling distribution of sample means approximately normal? Explain why or why not.
  - Which distribution is more appropriate to use to compute probabilities about the sample mean? Justify your selection. If the T-distribution is more appropriate, compute the degrees of freedom.
    - The standard normal distribution
    - The T-distribution
  - What is the range of average lengths of unusually short female babies?
  - What are the average lengths of female babies that correspond to the middle 95%?