7.3.1: Exercises

1. Iris wants to know the average number of days for symptoms to develop in people with COVID-19. She randomly samples 35 people with COVID-19, and records the number of days it takes for each subject to develop symptoms. Use the data to answer the following questions to build a 90% confidence interval.

5	5	5	8	3	3	6
2	6	3	7	7	5	8
6	5	6	6	3	5	2
4	2	7	7	4	5	4
8	3	8	2	4	7	7

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

b. Compute all sample statistics $(\bar{x}, s, n, df)$ and the critical value that corresponds to the confidence level (rounded to three decimal places).

$\bar{x} = \text{mean}(a) \approx$ _____ days

$s = \text{stdev}(a) \approx$ _____ days

$n =$ _____

$df = n - 1 =$ _____ $=$ _____

$T_c = \text{tdist}($_____$).\text{inversecdf}($_____$) \approx$ _____

c. Compute the margin of error $E = T_c \cdot \frac{s}{\sqrt{n}}$ (rounded to three decimal places).

d. Write the interval in interval notation $(\bar{x} - E, \bar{x} + E)$.

e. Interpret the interval in context.

2. The length of time students needed in order to complete a criminal justice test follows a distribution that is approximately normal. Cory finds a random sample of 10 criminal justice students and records their test taking times in minutes: A= [73.1, 70.4, 68.7, 72.9, 76.7, 78.2, 73.2, 70.2, 64.8, 66.7]. Construct a 95% confidence interval for the mean test taking time on the criminal justice test.

a. Step 1

b. Step 2

c. Step 3

d. Step 4

e. Step 5

3. Olu 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. Construct a 99% confidence interval for the mean female baby birth length in Olu's city.

4. Mars randomly sampled 42 college men and found a mean pulse rate of 70.42 beats per minute with a standard deviation of 9.948 beats per minute. Mars constructs a 95% confidence interval for the mean pulse rate for college men. Their solution is shown below. For each step, identify the error that they made and explain how to correct it and improve their solution.

   Step 1: $(0.95^{*}42) = 39.9 \geq 10$ so the sampling distribution is normal.

   Step 2: $T_c = \text{tdist}(42).\,\text{inversecdf}(0.95) \approx\ 1.682,\ \bar{x} = 70.42 \text{ bpm}, s = 9.948 \text{ bpm}, n = 42$

   Step 3: $E = 1.682 \cdot \frac{9.948}{\sqrt{42}} = 1.682 \cdot 1.54 = 2.59 \text{ bpm}$

   Step 4: $70.42 - 2.59 < \mu < 70.42 + 2.59,\ \text{so } 67.83 < \mu < 73.01.$

   Step 5: The true pulse rate of college men is between 67.83 and 73.01.