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Homework 6: Due Friday 6/26/2020

STAT-145-02

1. Suppose that 14 children, who were learning to ride two-wheel bikes, were surveyed to determine how long they had to use training wheels. It was revealed that they used them an average of six months with a sample standard deviation of three months. Assume that the underlying population distribution is normal.

1.

1. $\bar{X} = \underline{\quad 6 \text{ months} \quad}$

2. $S_X = \underline{\quad 3 \text{ months} \quad}$

3. $n = \underline{\quad 14 \quad}$

4. $n - 1 = \underline{\quad 13 \quad}$

2. Define the random variable X in words.

X is the amount of time a child needs training wheels.

3. Define the random variable \bar{X} in words.

\bar{X} is the mean amount of time a child needs training wheels in the sample of 14 children.

4. Which distribution should you use for this problem? Explain your choice.

Because the underlying population distribution is assumed normal, we will use the t-distribution.

5. Construct a 99% confidence interval for the population mean length of time using training wheels.

1. State the confidence interval.

$$\mu \in (3.585, 8.415)$$

2. Sketch the graph.

3. Calculate the ~~error bound~~ Margin of Error.

$$\frac{8.415 - 3.585}{2} = 2.415 = ME \quad (1)$$

6. Why would the error bound change if the confidence level were lowered to 90%?

90% is smaller than 99%, so the 90% margin of error should be smaller than 99%.

2. The Federal Election Commission (FEC) collects information about campaign contributions and disbursements for candidates and political committees each election cycle. A political action committee (PAC) is a committee formed to raise money for candidates and campaigns. A Leadership PAC is a PAC formed by a federal politician

(senator or representative) to raise money to help other candidates' campaigns. The FEC has reported financial information for 556 Leadership PACs that operating during the 2011–2012 election cycle. The following table shows the total receipts during this cycle for a random selection of 30 Leadership PACs.

| | | | | |
|------------------|------------|------------------|-------------------|-----------------|
| 46,500.00 | 0 | 40,966.50 | 105,887.20 | 5,175.00 |
| 29,050.00 | 19,500.00 | 181,557.20 | 31,500.00 | 149,970.80 |
| 2,555,363.20 | 12,025.00 | 409,000.00 | 60,521.70 | 18,000.00 |
| 61,810.20 | 76,530.80 | 119,459.20 | 0 | 63,520.00 |
| 6,500.00 | 502,578.00 | 705,061.10 | 708,258.90 | 135,810.00 |
| 2,000.00 | 2,000.00 | 0 | 1,287,933.80 | 219,148.30 |

$$\begin{aligned}\bar{X} &= \$251,854.23 \\ s &= \$521,130.41\end{aligned}\quad (2)$$

Use this sample data to construct a 96% confidence interval for the mean amount of money raised by all Leadership PACs during the 2011–2012 election cycle. Use the Student's t-distribution.

$$\mu \in (47261.64, 456446.82)$$

110. *Forbes* magazine published data on the best small firms in 2012. These were firms that had been publicly traded for at least a year, have a stock price of at least \$5 per share, and have reported annual revenue between \$5 million and \$1 billion. The [Table 8.13](#) shows the ages of the corporate CEOs for a random sample of these firms. ¹

| | | | | |
|-----------|-----------|-----------|-----------|-----------|
| 48 | 58 | 51 | 61 | 56 |
| 59 | 74 | 63 | 53 | 50 |
| 59 | 60 | 60 | 57 | 46 |
| 55 | 63 | 57 | 47 | 55 |
| 57 | 43 | 61 | 62 | 49 |
| 67 | 67 | 55 | 55 | 49 |

Use this sample data to construct a 90% confidence interval for the mean age of CEO's for these top small firms. Use the Student's t-distribution.

$$\mu \in (54.424, 58.71)$$

1. This question contains units that conflict with some of my text editors rendering logic. This has been rectified on my end, but briefly, the double dollar signs in the beginning of the question are necessary. [↩](#)