Worksheet 20 - sampling dist of slope

Monday, April 13, 2026

Math 58B - Jo Hardin

Name: _____

Names of people you worked with: _____

What is your favorite sea creature?

Task: Here we will work with one of the Rossman/Chance applets. Find the applet here: http://www.rossmanchance.com/applets/2021/regshuffle/regshuffle.htm
Set up the applet in the following way:

- Click on "Design Population" (also, select "Bivariate" just below "Design population")
- Change the population slope to equal 1
- Click on "Create Population"
- Click on "Show Sampling Options"
- Change the sample size to 15
- Take 500 samples from the population

a. What is the SE for the slope statistic?
b. (Using the answer to part a., but nothing about the applet beyond that.) Let's say you actually have a dataset (size $n = 15$) from the same population. If the sample you took had given you a $b_1 = 0.3$, what would your t score be? And would you reject $H_0 : \beta_1 = 0$ with that t score?
c. Was it reasonable of me to suggest that you might have gotten a sample (from the population as set above) with $b_1 = 0.3$? Explain.

Solution:

a. The sampling distribution of b_1 seems to have a SE of approximately 0.30.
b. If $b_1 = 0.3$, then the T score would be:

$$T = \frac{b_1 - 0}{SE} = \frac{0.3 - 0}{0.3} = 1$$

We would not reject $H_0 : \beta_1 = 0$ with a t score = 1.
c. The sampling distribution of b_1 seems to range from about 0 to about 2.0, so a value of $b_1 = 0.3$ is not impossible. However, if the true $\beta_1 = 1$, then the range of values for the majority of b_1 values is (0.4, 1.6). So $b_1 = 0.3$ would be unusual from this population.

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praise()
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[1] "You are terrific!"
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