BARBIE BUNGEE!!!! 2019!!!!! …

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| 1.STEP 1 … GATHER THE DATA   |  |  | | --- | --- | | Number of Rubber Bands | Distance Bungeed | | 2 | 17.5 | | 3 | 23 | | 4 | 27.5 | | 5 | 32.5 | | 6 | 37.5 | | 7 | 41.5 | | 8 | 46.5 | | 9 | 51 | | Team Name: P3  Teammate:   1. Jenna 2. Daniel 3. Fabio |
| You need a:  1. Dropper 2. Spotter 3. Recorder  Every group member should help with the calculations! |

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| --- | --- |
| 10 | 56.5 |
| 20 | 104 |

2. Step 2: Create a fully labeled scatter plot in R (preferably with ggplot) and paste it in the box below.

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| A picture containing wall, outdoor  Description automatically generated |

3. Conduct a hypothesis test to test the claim that the linear correlation coefficient / slope is different than zero. Show all 6 steps!

1.Ho:slope= 0

Ha:slope=0

2. Critical Value

T=+-2.36

1. T-Value = 92.67
2. P-value = 4.5\*e-12, reject Ho
3. Conclusion: There is strong evidence to suggest that the slope is not equal to zero (p-value 4.5\*e-12 with alpha=.05).

4. Was the linear correlation significantly different than zero? How do you know? Yes, the t-value was significantly greater than the p-value.

6. What is the estimate of the percent of the variation in the distance bungeed that is explained by the number or rubber-bands used? R-square = .999. It is estimated that 99% of the variation in distance is explained by the number of bands used.

7. Calculate and write down the linear regression equation (if appropriate) (don’t use “y” and “X” … use “Distance” and “Num\_RubberBands”: dist = 8.38 + 4.78 \* bands

8. Use R to find a confidence interval for the slope. Write the interval below as well as the margin of error (MOE). You can use the easy calculation for the MOE: (upper limit – lower limit) / 2

[4.66, 4.91] inches

MOE=.125

9. Interpret the slope and the interval you found above:

Slope: For every 1 band added, it is estimated that the mean increase in distance of the bungee jump will be 4.78inches. We are 95% confident that the mean is between 4.66inches and 4.91 inches.

10. Interpret the intercept:

When no bands are used, the statistical interpretation is that the barbie will fall 8.38 inches. However, practically this measurement probably approximates the barbie’s height.

11. Would using the interpretation about the intercept be extrapolation? Why or why not?

Our model is practically valid between 2 and 10 rubber bands and does not include 0 rubber bands. As such, this is considered extrapolation.

12. Next … you have the opportunity to collect a little more information! You may take one more jump but this time we have a longer tape measure. Simply choose the number of rubber bands you want to test and line up to collect your extra data point. NOTE: You are increasing the variance of X (number of rubber bands)!: sx2 .

What number of rubberbands did you use in this extra drop? 20

What is the sx2? 26.2666667

13. Next recalculate the intercept and slope using all your data points and write the new regression equation below. Dist= 8.39 + 4.78\*bands

14. What is the new confidence interval for the slope now that you have used all your data points? Recalculate the MOE and compare it to the one you found earlier. Which one is smaller?

4.724863---4.837066

MOE= 0.056. This MOE is smaller than the previous calculation.

15. Provide a plot of your data with the regression line.

A close up of a white wall

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16. Email this report to [bsadler@smu.edu](mailto:bsadler@smu.edu)

We have measured the distance from the top to the bottom of the Caruth Open Air Theater. It is 18ft 9 inches. Use your regression equation to estimate the number of rubber bands needed to bungee your super hero or Barbie that distance. The winner will bungee their subject closest to the ground without hitting any body part. Remember that it is ok if hair hits the ground but any other body part (hand, head, etc.) results in death or serious injury to super hero or Barbie and disqualification for you team! ☺

15. Start stringing those rubber bands together … then we are off to Caruth Open Air Theater!

BONUS if you have time!

Create a prediction interval using you regression equation for the distance covered by the number of rubber bands you chose. How could this help you with choosing you number of rubber bands? Will you change the number after looking at this?