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DA 6823

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Module 2: Part #1 (35 points)

**Standard Error of the Estimate + Confidence Intervals + the Logic of Hypothesis Testing + Type 1 and Type II errors**

**General Instructions:** In your own words, answer each of the following questions - don’t copy (e.g. cut and paste) some definition out of a book word for word. This is not a group project – you are expected to complete this module on your own. You may refer to text books, online or other sources but not your fellow classmates. If you don’t understand the question, feel free to ask the instructor in class, in office hours or in an email.

1. Explain in your own words in a couple of sentences what a confidence interval is (4 points)

A confidence interval attempts to show the level of uncertainty for a specific parameter. It provides an upper and lower limit for the parameter and contains a range of values most likely to contain the parameter’s true value with confidence. Confidence intervals use interval estimation rather than individual point estimation.

Confidence interval = sample mean +/- margin of error

1. Imagine that you had a random sample of 150 voters and 45% of them said that they would vote for Donald Trump.
   1. Produce a 95% confidence interval around that proportion. Show your work. (6 points)

p = 0.45

n = 150

z a/2: = 1.96

CI (p) =

A math equation with a square root

Description automatically generated

= 0.45 ± (1.96) √ ((0.45(1 – 0.45) / 150))

= 0.45 ± (1.96) √ ((0.45(**0.55**)/150))

= 0.45 ± (1.96) √ ((**0.2475**)/150))

= 0.45 ± (1.96) √ (**0.00165**)

= 0.45 ± (1.96) (**0.04062019202**)

= 0.45 ± (**0.07961557636**)

**CI (p) = 0.37 < p < 0.53**

1. Imagine that you took a random sample of 50 light bulbs and measured how long they lasted. Your experiment shows that the sample mean number of hours is 1150 and the sample standard deviation is 120 hours. Produce a 95% confidence interval around the mean. Show your work. (7 points)

x̄ = 1150

n = 50

σ = 120

CI (μ) =

A math symbols with black text

Description automatically generated with medium confidence

= 1150 ± (1.96) ((120) / (√50))

= 1150 ± (1.96) ((120) / (7.07106781187))

= 1150 ± (1.96) (16.9705627485)

= 1150 ± (33.262302987)

**CI (μ) = 1116.74 < μ < 1183.26**

1. Imagine that the population mean age for UTSA students is 26 and the population standard deviation is 4. Calculate the Z score the data point 24. Show your work (4 points)

x̄ = 24

σ = 4

μ = 26

A math equation with a number and a number

Description automatically generated with medium confidence

= ((24 – 26) / (4))

= (-2) / (4)

**Z = -0.50**

1. Draw a Z curve and mark off the value Z = 1.61. Using a z table what is the area to the right of z=1.61? (4 points)

A graph on a white paper

Description automatically generated

1. Draw a Z curve and mark the point Z=-.8 What is the area to the left of this z score? (4 points)

A graph on a piece of paper

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1. Draw a Z curve and mark off the Z score Z= -.34 and then mark off the Z score Z=.66 Now calculate the area under the curve between these two points. Show your work. (6 points).

A page of a paper with a graph and numbers

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