Stat Support Activity: Significance Levels

Significance Level Notes

- The person performing a hypothesis test will assign a significance level for the test.
- Significance Levels are also called Alpha Levels (α).
- Significance Levels (α) are the compliment of Confidence Levels $(1-\alpha)$.
- The most common significance level is 0.05 (5%), though 0.01 (1%) and 0.1 (10%) are also used occasionally.
- The significance levels determine the proportion in the tail or tails corresponding to the critical value or values. For right-tailed hypothesis tests, the proportion in the right tail corresponding to the critical value is the significance level (α). For left-tailed hypothesis tests, the proportion in the left tail corresponding to the critical value is the significance level (α). For two-tailed tests we will have two tails and two critical values. We will need to divide the significance level in half. The proportion in each of the two tails will be the significance level divided by two $\left(\frac{\alpha}{2}\right)$.
- Another important use of significance levels is when we compare P-values to them. The P-value is considered low if it is lower than the significance level. The P-value is considered high if it is higher than the significance level.

Problems

1.

Fill out the following table to determine the significance level alpha (α).

Confidence Level %	Confidence Level Proportion $(1-\alpha)$	Significance Level %	Significance Level Proportion (α)
95%			
90%			
99%			

(#2-8) Problem Directions: Draw a picture of the Z, T, χ^2, or F distribution curves. Use the given information to label the tail or tails, critical value or values, significance level proportion or proportions, and the test statistic. Does the test statistic fall in the tail?

2.

Distribution: Standard Normal Z Distribution

Right-Tailed Hypothesis Test

5% Significance Level (α = 0.05)

Critical Value = +1.645

Z-test statistic = +2.03

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3.

Distribution: Student T Distribution (Normal)

Left-Tailed Hypothesis Test

1% Significance Level (α = 0.01)

Critical Value = -2.435

T-test statistic = -1.779

4.

Distribution: Standard Normal Z Distribution

Two-Tailed Hypothesis Test

1% Significance Level (α = 0.01) *(Note: Split into two tails means that each tail will have 0.005)*

Critical Values = ± 2.576

Z-test statistic = $+1.24$

5.

Distribution: Chi-Square (χ^2) Distribution *(skewed right curve)*

Right-Tailed Hypothesis Test

10% Significance Level (α = 0.1)

Critical Value = +12.017

χ^2-test statistic = +14.812

6.

Distribution: Student T Distribution (Normal)

Two-Tailed Hypothesis Test

5% Significance Level (α = 0.05) *(Note: Split into two tails means that each tail will have 0.025)*

Critical Values = ± 2.035

T-test statistic = -3.066

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7.

Distribution: F − Distribution *(skewed right curve)*

Right-Tailed Hypothesis Test

5% Significance Level (α = 0.05)

Critical Value = +2.545

F-test statistic = +1.937

8.

Distribution: Standard Normal Z Distribution

Left-Tailed Hypothesis Test

10% Significance Level (α = 0.1)

Critical Value = -1.282

Z-test statistic = -1.73