SOLUTIONS TO

TEST YOUR KNOWLEDGE: The t-Distribution

1. A cereal company claims that there are at least 80 raisins in every box of its raisin bran. You decide to test the claim at a significance level (alpha) of .05. You randomly sample 25 boxes of cereal made by the company and find the sample mean to be 77.8 raisins with a sample standard deviation of 5.5 raisins.

(a) What are the null and alternate hypotheses?
(b) Draw the picture of the distribution of the test statistic (under H0). Include critical value(s) and region(s) of rejection.
(c) What is the calculated (computed) value of the test statistic?
(d) What is your conclusion?

\[ t_{24} = \frac{77.8 - 80}{5.5/\sqrt{25}} = \frac{-2.2}{1.1} = -2.00 \]

\[ t_{24} \] is located to the left of the critical value, so reject \( H_0 \).

2. A researcher is interested in measuring the average job satisfaction score (0 = lowest and 100 = highest) among full-time faculty at a college. She randomly samples 25 professors and finds the average job satisfaction to be 48.4 with a standard deviation of 6.1. Assume that job satisfaction follows a normal distribution.

(a) Using the above data, construct a 95% CIE for job satisfaction at this college.

\[ 48.4 \pm 2.0639 \left( \frac{6.1}{\sqrt{25}} \right) 
\]

\[ 48.4 \pm 2.0639 \left( \frac{6.1}{5} \right) 
\]

\[ 48.4 \pm 2.0639 \left( 1.22 \right) 
\]

\[ 48.4 \pm 2.5 
\]

\[ 45.9 \leq \ldots \leq 50.9 
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