

Problem:

Sugar is packed in 5-pound bags. An inspector suspects the bags may not contain 5 pounds. A sample of 50 bags produces a mean of 4.6 pounds and a standard deviation of 0.7 pound.

Is there enough evidence to conclude that the bags do not contain 5 pounds as stated at $\alpha = 0.05$? Also, find the 95% confidence interval of the true mean.

Solution

$H_0: \mu = 5$ and $H_1: \mu \neq 5$ (claim). The critical values are $+2.010$ and -2.010 .

test value is

$$t = \frac{\bar{X} - \mu}{s/\sqrt{n}} = \frac{4.6 - 5.0}{0.7/\sqrt{50}} = \frac{-0.4}{0.099} = -4.04$$

Since $-4.04 < -2.010$,

the null hypothesis is rejected. There is enough evidence to support the claim that the bags do not weigh 5 pounds.

The 95% confidence for the mean is given by

$$\begin{aligned}\bar{X} - t_{\alpha/2} \frac{s}{\sqrt{n}} &< \mu < \bar{X} + t_{\alpha/2} \frac{s}{\sqrt{n}} \\ 4.6 - (2.010) \left(\frac{0.7}{\sqrt{50}} \right) &< \mu < 4.6 + (2.010) \left(\frac{0.7}{\sqrt{50}} \right) \\ 4.4 &< \mu < 4.8\end{aligned}$$

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