

Review:

Wednesday, March 28, 2018 4:32 PM

A random sample of 400 Tech students were recently surveyed to find out how many of them had skipped at least one class. The results of the survey were that 326 of them had skipped at least one class. Construct a 90% confidence interval for the percentage of Tech students who have skipped at least one class.

↑
P

check:
$$\left. \begin{array}{l} np = 326 \\ nq = 400 - 326 \end{array} \right\} > 5 \checkmark$$

$$P = \hat{p} \pm Z_{\alpha/2} \sqrt{\frac{\hat{p}\hat{q}}{n}}$$

$$= \frac{326}{400} \pm 1.645 \sqrt{\frac{\left(\frac{326}{400}\right)\left(1 - \frac{326}{400}\right)}{400}}$$

$$= 0.815 \pm 0.031937$$

The 90% confidence interval is between 78.3% and 84.7% of students skipped at least one class.

$$90\% \text{ CI} = 78.3\% \text{ to } 84.7\%$$

In BC, it usually costs \$25,400 to repair a bridge for storm damage. This year, a random sample of 55 bridges showed an average cost per repaired bridge was \$25,950 with standard deviation of \$2,750. Using the p-value approach, determine the significance of this increase.

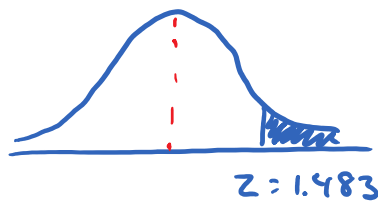
$$H_0: \mu = 25400$$

$$H_a: \mu > 25400$$

test statistic:

$$\begin{aligned} Z &= \frac{\bar{X} - \mu_0}{s/\sqrt{n}} \\ &= \frac{25950 - 25400}{2750/\sqrt{55}} \\ &= 1.483 \end{aligned}$$

p-test



area
0.4306

$$\begin{aligned} p &= 0.5 - 0.4306 \\ &= 0.0694 \end{aligned}$$

$$0.05 < p < 0.1$$

Conclusion:

The increase is tending towards significance.

Suppose that the time it takes to fill a gas tank is an exponential distribution with a mean time of 42 seconds. What's the probability that it will take you longer than a minute to fill your gas tank? Less than a minute? Exactly one minute?

$$P(a < x < b) = \int_a^b f(x) dx$$

$$\mu = 42$$

$$k = \frac{1}{42}$$

$$P(x > 60) = \int_{60}^{\infty} k e^{-kx} dx \quad \text{with } \mu = \frac{1}{k}$$

$$= \int_{60}^{\infty} \frac{1}{42} e^{-\frac{1}{42}x} dx$$

$$= -e^{-\frac{1}{42}x} \Big|_{60}^{\infty}$$

$$= +e^{-\frac{60}{42}} \approx 0.239651$$

or 24%

$$P(x < 60) = 1 - 0.239651$$

$$\approx 76\%$$

$$P(x = 60) = 0$$