KEY

MCTC C-Now Intro Stats **9.2 Calculating P-values Classwork**

1. A rental car fleet owner suspects the mean annual mileage of his cars is greater than the national mean of 12,000 miles.

   The null and alternative hypotheses are

   $H_0: \mu = 12{,}000$ miles

   $H_a: \mu > 12{,}000$ miles

   He selects a random sample of 225 cars and finds that

   $\bar{x} = 12{,}375$ miles $s = 2{,}415$ miles

   Determine the z-score for the sample.

   $$z = \frac{12{,}375 - 12{,}000}{2{,}415/\sqrt{225}} = 2.33$$

   Determine the *P-value* for the sample.

   $$z = 2.33 \xrightarrow{\text{Table}} \text{P-value} = 1 - .9901 = .0099$$

   What does this P-value imply?

   Because the P-value is significant, reject H_0.
   There is strong evidence that his cars travel on average more than 12,000 miles per year.

2. At one school, the average amount of time that tenth-graders spend watching television each week is 21 hours. The principal introduces a campaign to encourage the students to watch less television.

   The null and alternative hypotheses are

   $H_0: \mu = 21$ hrs

   $H_a: \mu < 21$ hrs

   A year later she selects a random sample of 80 students and finds that $\bar{x} = 20.4$ hours $s = 2.4$ hours

   Determine the z-score for the sample.

   $$z = \frac{20.4 - 21}{2.4/\sqrt{80}} = -2.24$$

   Determine the *P-value* for the sample.

   $$z = -2.24 \xrightarrow{\text{Table}} \text{P-value} = .0125$$

   What does this P-value imply?

   Because the P-value is significant, reject H_0.
   There is strong evidence that the average time 10^{th}-graders spend watching tv each week at this school is less than 21 hours.

3. A health insurer has determined that the reasonable fee for a certain medical procedure is \$1200. They suspect that the average fee charged by one particular clinic for this procedure is higher than \$1200.

The null and alternative hypotheses are

$H_0: \mu = \$1{,}200$

$H_a: \mu > \$1{,}200$

They select a random sample of 65 patients and find that $\bar{x} = \$1{,}280$ $s = \$220$

Determine the z-score for the sample.

$$Z = \frac{1{,}280 - 1{,}200}{220/\sqrt{65}} = 2.93$$

Determine the *P-value* for the sample.

$$Z = 2.93 \xrightarrow{\text{Table}} P\text{-value} = 1 - .9983 = .0017$$

What does this P-value imply?

Because the P-value is significant, reject Ho.
There is strong evidence that the average fee charged by one particular clinic for this procedure is higher than \$1200.

4. A drug company that wants to be sure that its "500-milligram" aspirin tablets really contain 500 milligrams of aspirin.

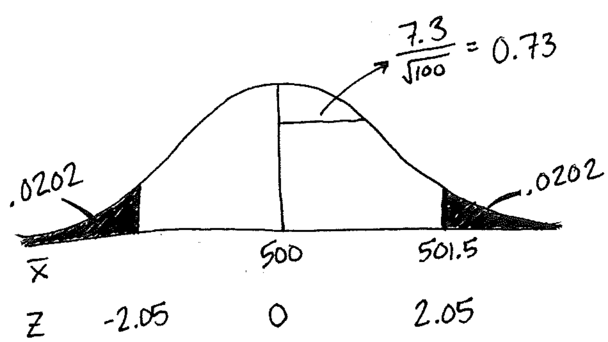
The null and alternative hypotheses are

$H_0: \mu = 500$ milligrams

$H_a: \mu \neq 500$ milligrams

The company selects a random sample of $n = 100$ tablets and finds that they have a mean weight of $\bar{x} = 501.5$ milligrams and a standard deviation of $s = 7.3$ milligrams.

$$Z = \frac{501.5 - 500}{7.3/\sqrt{100}} = 2.05$$



P – value for one tailed $Z = 2.05 \xrightarrow{\text{Table}} P\text{-value} = 1 - .9798 = .0202$

P – value for two tailed $.0202 \times 2 = .0404$