

1. In your work for a national health organization, you are asked to monitor the amount of sodium in a certain brand of cereal. You find that a random sample of 82 cereal servings has a mean sodium content of 233 milligrams. Assume the population standard deviation is 10 milligrams. At  $\alpha = 0.01$ , can you conclude that the mean sodium content per serving of cereal is different from 230 milligrams?

**(a) (DESIGN)** State your Hypotheses in words and parameters.

**Ho:** The mean sodium content per serving of cereal is not different from 230 milligram

**Ha:** The mean sodium content per serving of cereal is different from 230 milligrams

$$\text{Ho: } \mu = 230$$

$$\text{Ha: } \mu \neq 230$$

**(b) (DESIGN)** State Significance Level of the test and explain what Type I error is in context.

$\alpha = .05$ , which represents the maximum design probability of Type I error, which would be claiming the mean sodium content per serving of cereal is different from 230 milligrams, when in fact the mean is 230 milligrams.

**(c) (DESIGN)** Determine the statistical model (test statistic)

Test of mean vs. Hypothesized Value,  
population standard deviation unknown.

$$Z = \frac{\bar{X} - \mu_0}{\sigma / \sqrt{n}}$$

This is a two-tail test, so  $\alpha$  will need to be split into 2 parts.

**(d)**



Reject Ho if  $Z < -2.576$  or  $Z > 2.576$

**(e) (DATA)** Conduct the test and circle your decision

$$Z = (233 - 230) / (10 / \sqrt{82}) = 2.72$$


This value is in the rejection region

Reject Ho

**(f) (CONCLUSION)** State your overall conclusion in language that is clear, relates to the original problem and is consistent with your decision.

The mean cereal sodium is different from 230 mg.

2. A tourist agency in Florida claims the mean daily cost of meals and lodging for a family of four traveling in Florida is no more than \$284. You work for a consumer protection advocate and want to test this claim. In a random sample of 50 families of four traveling in Florida, the mean daily cost of meals and lodging is \$292. Assume the population standard deviation is \$25. At  $\alpha = 0.05$ , do you have enough evidence to reject the agency's claim?

<p><b>(a) (DESIGN)</b> State your Hypothesis</p> <p><b>Ho: The mean daily cost of meals and lodging for a family of four traveling in Florida is no more than \$284</b></p> <p><b>Ha: The mean daily cost of meals and lodging for a family of four traveling in Florida is more than \$284</b></p> <p><b>Ho: <math>\mu \leq 284</math></b></p> <p><b>Ha: <math>\mu &gt; 284</math></b></p>	<p><b>(d) (DESIGN)</b> Determine decision rule (p-value method)</p> <p><b>Reject Ho if p-value &lt; 0.05 (<math>\alpha</math>)</b></p> <p><b>(e) (DATA)</b> Conduct the test, graph and shade the test statistic find the p-value and <b>circle</b> your decision.</p>  <p><b><math>Z = (292-284)/(25/\text{sqrt}(50)) = 2.26</math></b></p> <p><b>p-value = <math>P(Z &gt; 2.26) = 0.0119 &lt; \alpha</math></b></p> <p><b>Reject Ho</b></p>
<p><b>(b) (DESIGN)</b> State Significance Level of the test and explain what Type II error would be.</p> <p><b><math>\alpha = 0.05</math></b></p> <p><b>Type II Error:</b>  <b>Failing to claim the mean cost of lodging and meals is over \$284, when it in fact the mean cost is over \$284</b></p>	<p><b>(f) (CONCLUSION)</b> State your overall conclusion in language that is clear, relates to the original problem and is consistent with your decision.</p>
<p><b>(d) (DESIGN)</b> Determine the statistical model (test statistic)</p> <p><b>Test of mean vs. Hypothesized Value, population standard deviation unknown.</b></p> $Z = \frac{\bar{X} - \mu_0}{\sigma / \sqrt{n}}$ <p><b>This is a right tail test, so <math>\alpha</math> will be only in the upper tail.</b></p>	<p><b>The mean daily cost of meals and lodging for a family of four traveling in Florida is more than \$284</b></p>