

Quick Questions 13 Large Sample Hypothesis Testing

- I. Complete the following chart and questions.
- Type I error is called alpha error.
 - Type II error is called beta error.
 - When z calculated from sample data is beyond the critical value (less than for left tail problems and greater than for right tail problems), the null hypothesis is rejected.
 - True

Error Summary		
Decision Concerning Null Hypothesis	Nature's True State	
	H_0 is true	H_0 is false
Accept H_0	Correct	Type II error
Reject H_0	Type I error	Correct

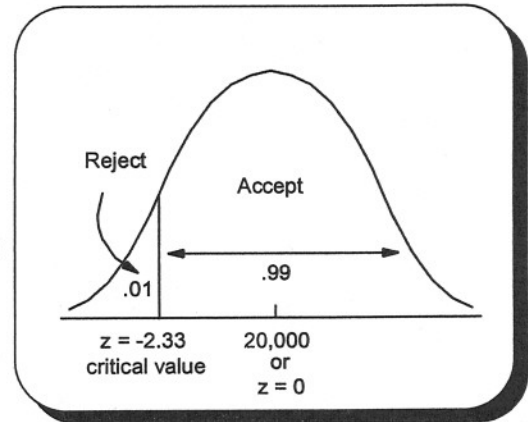
- II. Make these tests using the 5-step approach to hypothesis testing.

- A. A light bulb warranty states average bulb life is at least 20,000 hours. A sample of 49 bulbs had an average life of 19,000 hours. The population standard deviation is 1,400 hours. Test the warranty claim to the .01 level of significance.

- $H_0 : \mu \geq 20,000$ hours $H_1 : \mu < 20,000$ hours
- $\alpha = .01$ (Note: H_1 points to the area of rejection)
- \bar{x} is the test statistic.
- The critical value of z for .01 is -2.33. If the test Z is beyond -2.33, reject H_0 .
- Apply the decision rule.

$$Z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} = \frac{19,000 - 20,000}{\frac{1,400}{\sqrt{49}}} = \frac{-1,000}{200} = -5.0$$

Reject H_0 because -5.0 is beyond -2.33.
The claim is not substantiated.



- B. Average weekly manufacturing earnings were \$480 and the standard deviation was \$72. A recent sample of 36 resulted in a mean of \$450. The standard deviation has not changed. Test to the .05 level whether average weekly earnings changed.

- $H_0 : \mu = \$480$ and $H_1 : \mu \neq \$480$
- $\alpha = .05$
- \bar{x} is the test statistic.
- The critical value of z for $\alpha + 2 = .05/2 = .025$ is ± 1.96 . If the test Z is beyond ± 1.96 , reject H_0 .
- Apply the decision rule.

$$Z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} = \frac{450 - 480}{\frac{72}{\sqrt{36}}} = \frac{-30}{12} = -2.50$$

Reject H_0 because -2.50 is beyond -1.96.
Weekly earnings changed.

