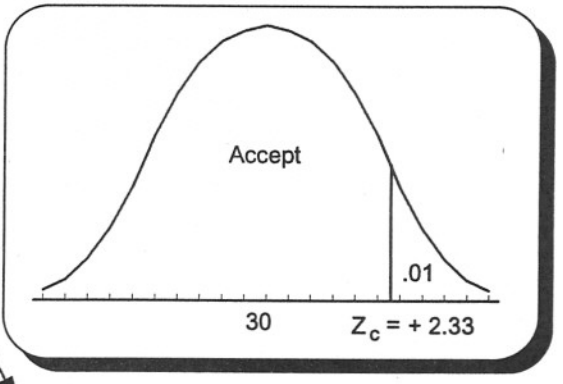
Practice Set 13 Large Sample Hypothesis Testing

I. Darin Jones is very concerned that parts designed to weigh less than or equal to 30 mg may be too heavy and not pass inspection. From page 68, we know that a sample of 36 parts resulted in a sample mean of 30.025 mg and a sample standard deviation of .065 mg. Darin wants to control type I error (the probability of deciding the parts that are too heavy when they are not) to the .01 level of significance. Solve this problem using the 5-step approach to hypothesis testing.

1. $H_o : \mu \leq 30$ mg and $H_1 : \mu > 30$ mg
2. $\alpha = .01$
3. $\bar{x}$ is the test statistic.
4. The critical value for .01 is z = 2.33.
   If the test Z is beyond 2.33, reject H_0.
5. Apply the decision rule.

$$Z = \frac{\bar{x}-\mu}{\frac{\sigma}{\sqrt{n}}} = \frac{30.025-30.000}{\frac{.065}{\sqrt{36}}} = \frac{.025}{.0108} = 2.315$$

Accept H_0 because 2.315 < 2.33. Parts are not too heavy.



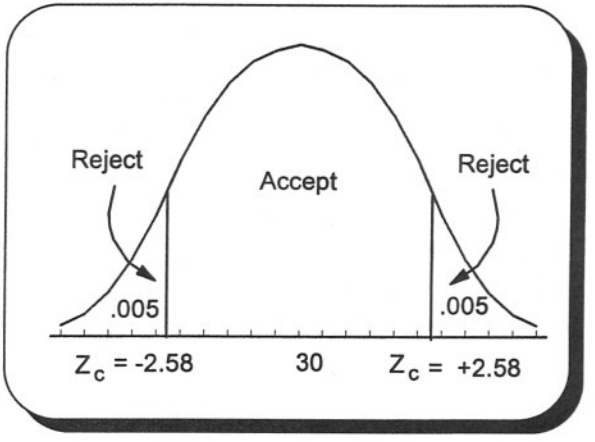
Note: For those using the p-value approach discussed in chapter 14, the p-values for problems 1, 2, and 3 using z are .0103, 0206, and .0206 respectively.

II. Using the problem I data and a .01 level of significance, determine whether the population mean has changed from 30 milligrams.

Given:	n = 36	$\bar{x}$ = 30.025	s = .065	α = .01

1. $H_o : \mu = 30$ mg $H_1 : \mu \neq 30$ mg
2. $\alpha = .01$
3. $\bar{x}$ is the test statistic.
4. The critical value of z for $\alpha/2 = .01/2 = .005$ is ± 2.58.
   If the test Z is beyond ± 2.58, reject H_0.
5. Apply the decision rule.

2.315 < 2.58, accept H_0



III. Redo problem II using a .05 level of significance.

1. For steps 1 and 3, see problem two.
4. The critical value of z for $\alpha/2 = .05/2 = .025$ is ± 1.96.
5. If z is beyond ± 1.96, reject H_0.

Reject H_0 because 2.315 > 1.96. Parts are too heavy.