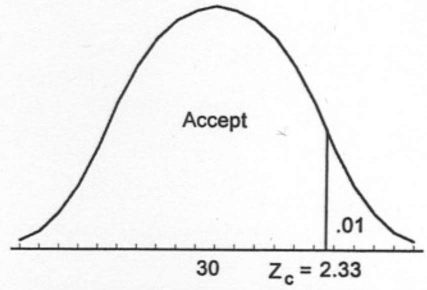
II. Darin has decided to determine the p-value associated with the test of the 30-milligram parts conducted in problem 1 on page 86. This data was first analyzed on page 68.

Problem Review

Given: $\bar{x} = 30.025$ mg, $n = 36$, $s = .065$ mg, and $\alpha = .01$

$H_0 : \mu \leq 30.00$ mg $\quad H_1 : \mu > 30.00$ mg

$$Z = \frac{\bar{x}-\mu}{\frac{s}{\sqrt{n}}} = \frac{(30.025 - 30.000)}{\frac{.065}{\sqrt{36}}} = 2.315 < 2.33\text{, accept } H_0$$



A. Calculate the p-value associated with this study.

$z = 2.315 \rightarrow .4897$ and $.5000 - .4897 = .0103 = 1.03\%$

Accept H_0 because $.0103 > .01$.

B. Use this p-value to accept or reject the null hypothesis. Does your answer agree with the page 86 answer?

Yes

C. What does this p-value indicate is the strength or validity of the decision made concerning the null hypothesis?

The low p-value indicates the hypothesis is barely accepted.

III. Past experience indicates that the population mean weight of material containers used to make computer parts is 5,000 kilograms. The standard deviation is 28 kilograms. Type I error for a sample of 49 will be controlled to the .01 level of significance. The 99% confidence interval is 4,989.68 kilograms to 5,010.32 kilograms.
A. Calculate the type II error for a two-tail problem using each of these possible population means.

$\mu_1 = 4,985$ kg

$$Z = \frac{x_c - \mu_1}{\frac{\sigma}{\sqrt{n}}} = \frac{4,989.68 - 4,985.00}{\frac{28}{\sqrt{49}}}$$

$= 1.17 \rightarrow .3790$

$.50 - .379 \rightarrow 12.1\%$

$\mu_2 = 4,995$ kg

$$Z = \frac{x_c - \mu_2}{\frac{\sigma}{\sqrt{n}}} = \frac{4,989.68 - 4,995.00}{\frac{28}{\sqrt{49}}}$$

$= 1.33 \rightarrow .4082$

$.50 - .4082 = .0918$

$.50 + .0918 = 59.18\%$

$\mu_3 = 5,000$ kg

There isn't any type II error as the null hypothesis is true. At a point just before 5,000 mg, type II error is 98+%.

$\mu_4 = 5,005$ kg

$$Z = \frac{x_c - \mu_4}{\frac{\sigma}{\sqrt{n}}} = \frac{5,010.32 - 5,005.00}{\frac{28}{\sqrt{49}}}$$

$= 1.33 \rightarrow .4082$

$.50 - .4082 = .0918$

$.50 + .0918 = 59.18\%$

$\mu_5 = 5,015$ kg

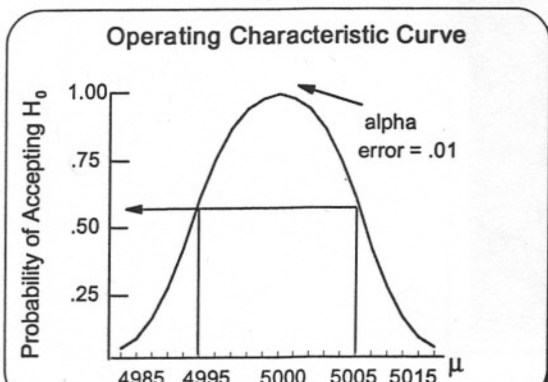
$$Z = \frac{x_c - \mu_4}{\frac{\sigma}{\sqrt{n}}} = \frac{5,010.32 - 5,015.00}{\frac{28}{\sqrt{49}}}$$

$= 1.17 \rightarrow .3790$

$.50 - .379 \rightarrow 12.1\%$

B. Using the data calculated in problem A, sketch and label an operating characteristic curve.

C. Using the data calculated in problem A, sketch and label a power curve.



Note: The x-axis on these two graphs is not drawn to scale.