II. Ace Realty wants to determine whether the average time it takes to sell homes is different for its two offices. A sample of 40 from office #1 revealed a mean of 90 days and a standard deviation of 15 days. A sample of 50 from office #2 revealed a mean of 100 days and a standard deviation of 20 days. Use a .05 level of significance.

Office #1	$n_1 = 40$	$\bar{x}_1 = 90$ days	$s_1 = 15$ days
Office #2	$n_2 = 50$	$\bar{x}_2 = 100$ days	$s_2 = 20$ days

1.	$H_o: \mu_1 = \mu_2$ and $H_1: \mu_1 \neq \mu_2$
2.	$\alpha = .05$ and $.05 \div 2 = .025$
3.	$\bar{X}$ is the test statistic.
4.	The critical value for .025 is ± 1.96. If the test Z is beyond -1.96, reject H_o.
5.	Apply the decision rule.

$$Z = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = \frac{90-100}{\sqrt{\frac{(15)^2}{40} + \frac{(20)^2}{50}}} = \frac{-10}{\sqrt{5.625+8}} = -2.71$$

Reject H_0 because −2.71 is beyond − 1.96.
Sales time is not the same at these two offices.

III. Tough Tire Company is concerned that tread life of its new all weather tire may be below the 70,000 mile warranty. A sample of 36 revealed a mean of 69,800 miles and a standard deviation of 750 miles. Using a .05 level of significance and the p-value approach, test Tough Tire's warranty claim.

Given: $\bar{x} = 69,800$ miles, $n = 36$

$s = 750$ miles and $\alpha = .05$

$H_0: \mu \geq 70,000$ miles $H_1: \mu < 70,000$ miles

$$Z = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}} = \frac{(69,800 - 70,000)}{\frac{750}{\sqrt{36}}} = \frac{-200}{125} = -1.60$$

$z = -1.60 \rightarrow .4452$ and $p = .5000 - .4452 = .0548$

Accept H_0 because .0548 > .05. Warranty is substantiated.

IV. The Easy Loan Company wants to determine whether the average length of car loans has increased from last year's population mean of 50 months. A sample of 49 had a mean of 53 months and a standard deviation of 14 months.

A. Test $H_0: \mu \leq 50$ and $H_1: \mu > 50$ at the .05 level of significance.

Given: $\bar{x} = 53$ months, $n = 49$
$s = 14$ months and $\alpha = .05$
$\alpha = .05 \rightarrow z = 1.645$

$$Z = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}} = \frac{(53-50)}{\frac{14}{\sqrt{49}}} = \frac{3}{2} = 1.50$$

Accept H_0 because 1.50 < 1.645
Loan length did not increase.

B. Calculate the critical value of $\bar{x}$.

$$\bar{x} = \mu + z\frac{\sigma}{\sqrt{n}}$$
$$= 50 + 1.645\frac{14}{\sqrt{49}}$$
$$= 50 + 3.29$$
$$= 53.29$$

C. Calculate type II error for $\mu = 55$ months.

$$Z = \frac{\bar{x} - \mu_1}{\frac{\sigma}{\sqrt{n}}} = \frac{53.29 - 55.00}{\frac{14}{\sqrt{49}}} = \frac{-1.71}{2} = -.855 \rightarrow .3037$$

.50 − .3037 = 19.63%

D. What is the type II error for these population means?

54 months

$$Z = \frac{\bar{x} - \mu_2}{\frac{\sigma}{\sqrt{n}}} = \frac{53.29 - 54}{\frac{14}{\sqrt{49}}} = \frac{-.71}{2} = -.355 \rightarrow .1387$$

.50 − .1387 = 36.13%

53.31 months

$$Z = \frac{\bar{x} - \mu_3}{\frac{\sigma}{\sqrt{n}}} = \frac{53.29 - 53.31}{\frac{14}{\sqrt{49}}} = \frac{-.02}{2} = -.01 \rightarrow .0040$$

.50 − .004 = 49.6%

50.01 months

$$Z = \frac{\bar{x} - \mu_4}{\frac{\sigma}{\sqrt{n}}} = \frac{53.29 - 50.01}{\frac{14}{\sqrt{49}}} = \frac{-3.28}{2} = -1.64 \rightarrow .4495$$

.4495 + .5000 = .9495

Note: When the population mean is 50 months or less, the null hypothesis is true and type II error (accepting a false null hypothesis) does not exist. The maximum type II error is 95% for the 5% level of significance.

QQ 92 and 93