1. $H_0 : P = 0.7$
$H_1 : P \neq 0.7$

Level of Significance $= \alpha = 0.10$

Test Statistic : Binomial Variable X with $P = 0.7$ and n

$X = 8$ and $nP_0 = 15 \times 0.7 = 10.5$

$\therefore P = 2P(X \leq 8 \text{ when } p = 0.7)$
$= 2 \sum_{x=0}^{8} b(x; 15, 0.7)$

$= 2 \times 0.1311$ (From Binomial Prob. Table)
$= 0.2628$

$\therefore P > 0.10$ i.e $P > \alpha$
$\therefore$ Don't reject to Conclude that there is insufficient e
to dobut the builder's claim

2. $H_0 : P = 0.6$
$H_1 : P > 0.6$

Level of Significance $= \alpha = 0.05$

Given : $x = 70$, $n = 100$, $P = 0.6$

$$Z = \frac{x - np_0}{\sqrt{np_0q_0}}$$

$Z = 2.04$

$P = P(Z > 2.04)$

As, $P < \alpha$, reject H_0 and conclude that new drug is superior

3. Let P_1 be the proportion of Mumbai voters and P_2 be the proportion of surrounding are resident.

$\hat{P}_1 = \frac{120}{200} = 0.6$

$\hat{P}_2 = \frac{240}{500} = 0.48$ $\alpha = 5\%$

$\hat{P}_p = \frac{120+240}{200+300} = 0.514$

α Hypothesis

$H_0 : P_1 \leq P_2$

$H_1 : P_1 > P_2$

$$Z = \frac{\hat{P}_1 - \hat{P}_2}{\sqrt{\hat{P}_p \cdot (1-\hat{P}_p)\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}}$$

$$Z = \frac{0.6 - 0.48}{\sqrt{0.514\,(1-0.514)\left(\frac{1}{200}+\frac{1}{500}\right)}}$$

$Z = 2.869$

$P = P(Z > 2.869) = 0.0044$

4. a

b

c

4. a Null Hypothesis

$H_0: p = 0.20$

Alternate Hypothesis

$H_1: p > 0.20$

The critical region is in right tail

b Null Hypothesis

$H_0: \mu = 3$

Alternate Hypothesis

$H_1: \mu \neq 3$

The critical region in both tails

c Null Hypothesis

$H_0: \mu = 500$

Alternative Hypothesis

$H_1: \mu > 500$

The critical region is in right tail

d Null Hypothesis

$H_0: \mu = 15$

Alternative Hypothesis

$H_1: \mu \neq 15$

The critical region is in both tails

5. Let μ_1 and μ_2 be the population mean 'robustness'' of laptops supplied by company A and company B respectively

$$H_0 : \mu_1 = \mu_2$$

$$H_1 : \mu_1 \neq \mu_2$$

Significance level $= \alpha = 0.05$

$$\bar{X}_1 = \frac{1}{n_1} \sum_{i=1}^{n} x_{1i}$$

$$\bar{X}_1 = \frac{9.3+8.8+6.8+8.7+8.5+6.7+8.0+6.5+9.2+7.0}{10}$$

$$\bar{X}_1 = 7.95$$

$$\bar{X}_2 = \frac{1}{n_2} \sum_{i=1}^{n_2} x_{2i}$$

$$\bar{X}_2 = \frac{11.0+9.8+9.9+10.2+10.1+9.7+11.0+11.1+10.2+9.6}{10}$$

$$\bar{X}_2 = 10.26$$

$$S_1^2 = \frac{1}{n_1-1}\left[\sum_{i=1}^{n_1} x_{1i}^2 - n_1 \bar{X}_1^2\right]$$

$$S_1^2 = 1.207$$

Similarly $S_2^2 = 0.325$

Since Sample Variance are quite different, we cannot assume that population variances are equal, so we will use the [illegible]