Assignment No. 7.1

Q.1) → Given Data:-

$\bar{X} = 20$ $\quad \bar{Y} = 15$ $\quad$ 99% C.I.

$n_1 = 500$ $\quad n_2 = 1000$ $\quad \alpha = \frac{1}{100} = 0.01$

$S_1 = 3$ $\quad S_2 = 2$ $\quad \frac{\alpha}{2} = 0.005$

$$(\bar{X} - \bar{Y}) - Z\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}} < \mu_1 - \mu_2$$

$$< (\bar{X} - \bar{Y}) + Z\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}$$

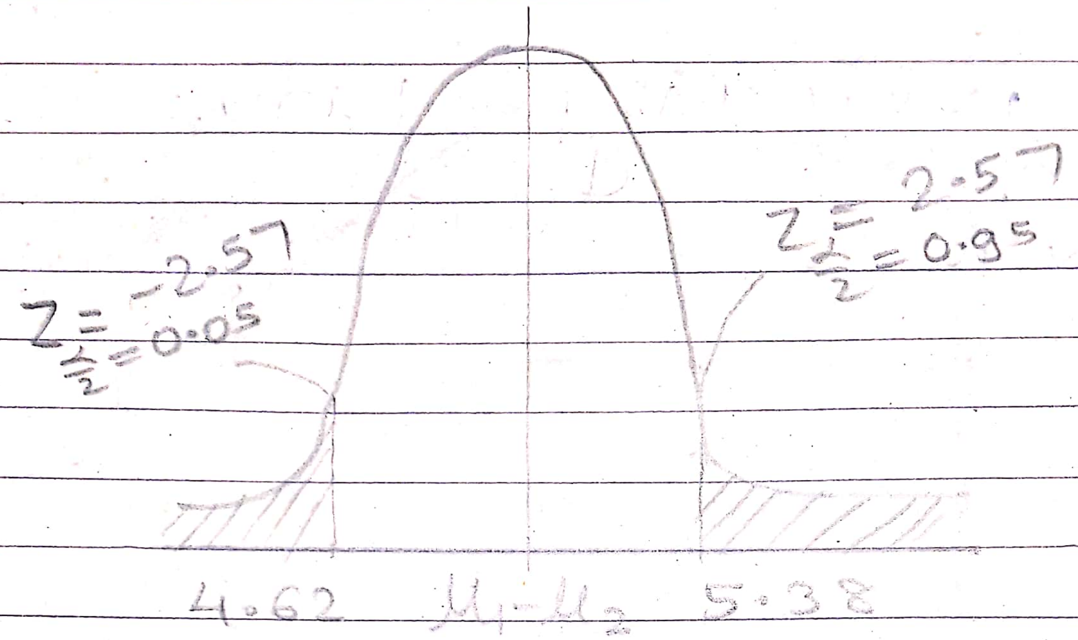
PAGE No

DATE / /

$$5 - 0.38 < \mu_1 - \mu_2 < 5 + 0.38$$

$$4.62 < \mu_1 - \mu_2 < 5.38$$

1) →



Q. 2) → Given Data:-

$n_1 = 15$ $S_1 = 100$

$n_2 = 20$ $S_2 = 90$

$\alpha = \frac{10}{100}$ $\alpha = 0.1$ $\frac{\alpha}{2} = 0.05$

$\bar{X} = 1000$ $Y = 950$

$X - Y = 1000 - 950 = 50$

To find:- Pooled Variance & Confidence interval

i) Pooled Variance

$$S^2_{pooled} = \frac{(n_1-1) S_1^2 + (n_2-1) S_2^2}{(n_1+n_2-2)}$$

$$= \frac{14 \times (100)^2 + (19) \times (90)^2}{15+20-2}$$

$$= \frac{(14 \times 10,000) + (19 \times 8100)}{33}$$

$$= \frac{140,000 + 153,900}{33}$$

$$S^2_{pooled} = 8906.06$$

$$\therefore S_{pooled} = \sqrt{8906.06} = 94.37$$

ii) Finding the product

$$t_{\frac{\alpha}{2}} \cdot S_{pooled} \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

$t_{\frac{\alpha}{2}} =$ Sp.t.ppf(0.05, 33) = −1.692

$\left[ \because D.O.F. = n_1 + n_2 - 2 \right.$
$= 15 + 20 - 2$
$\left. = 33 \right]$

= Sp.t.ppf(0.95, 33) = 1.692

$$= 1.692 \times 94.37 \sqrt{\frac{1}{15} + \frac{1}{20}}$$

$$= 1.692 \times 94.37 \times \sqrt{0.066 + 0.050}$$

$$= 1.692 \times 94.37 \times \sqrt{0.116}$$

$$= 1.692 \times 94.37 \times 0.340$$

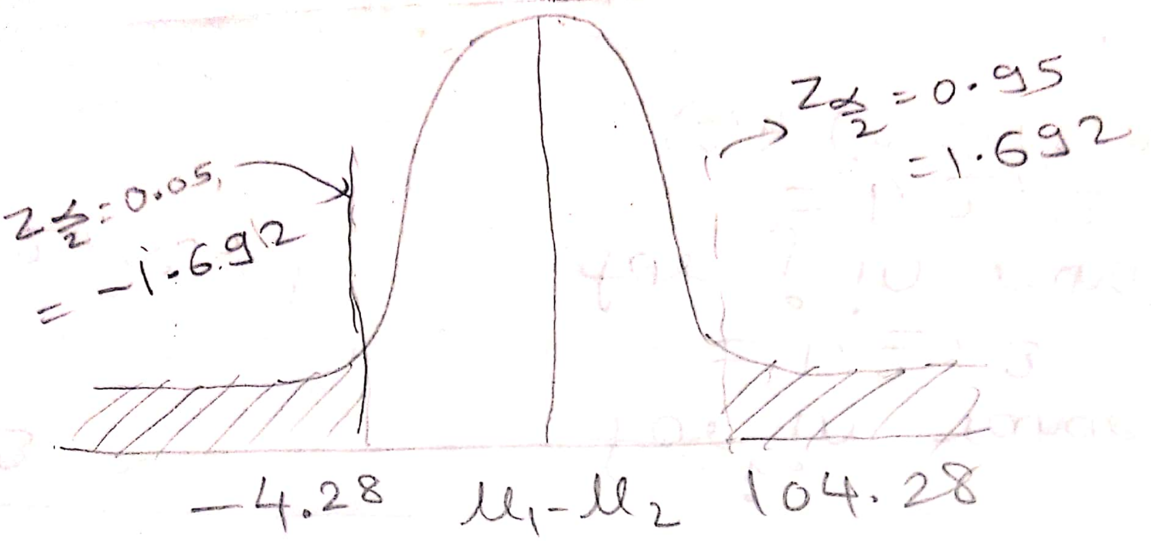
$$= 54.28$$

Confidence Interval

$$50 - 54.28 < \mu_1 - \mu_2 < 50 + 54.28$$

$$-4.28 < \mu_1 - \mu_2 < 104.28$$

Q.2) →



$Z_{\frac{\alpha}{2}} = 0.05$, $= -1.692$
$Z_{\frac{\alpha}{2}} = 0.95$ $= 1.692$
$-4.28$
$\mu_1 - \mu_2$
$104.28$

3] → Given Data:-

$S_1^2 = (5.8)^2 = 33.64$ $\quad S_2^2 = (3.4)^2 = 11.56$

$\alpha = \frac{5}{100}$

$n_1 = 6$ $\quad n_2 = 4$

$\alpha = 0.05$

$r_1 = n_1 - 1$ $\quad r_2 = n_2 - 1$ $\quad \frac{\alpha}{2} = 0.025$

$= 6 - 1$ $\quad = 4 - 1$

$= 5$ $\quad = 3$

$$\frac{\sigma_2^2}{\sigma_1^2} = F_{\left(\frac{\alpha}{2},\, r_2,\, r_1\right)} * \frac{S_2^2}{S_1^2}$$

Sp.f.ppf(0.025, 3, 5) = 0.067

Sp.f.ppf(0.975, 3, 5) = 7.763

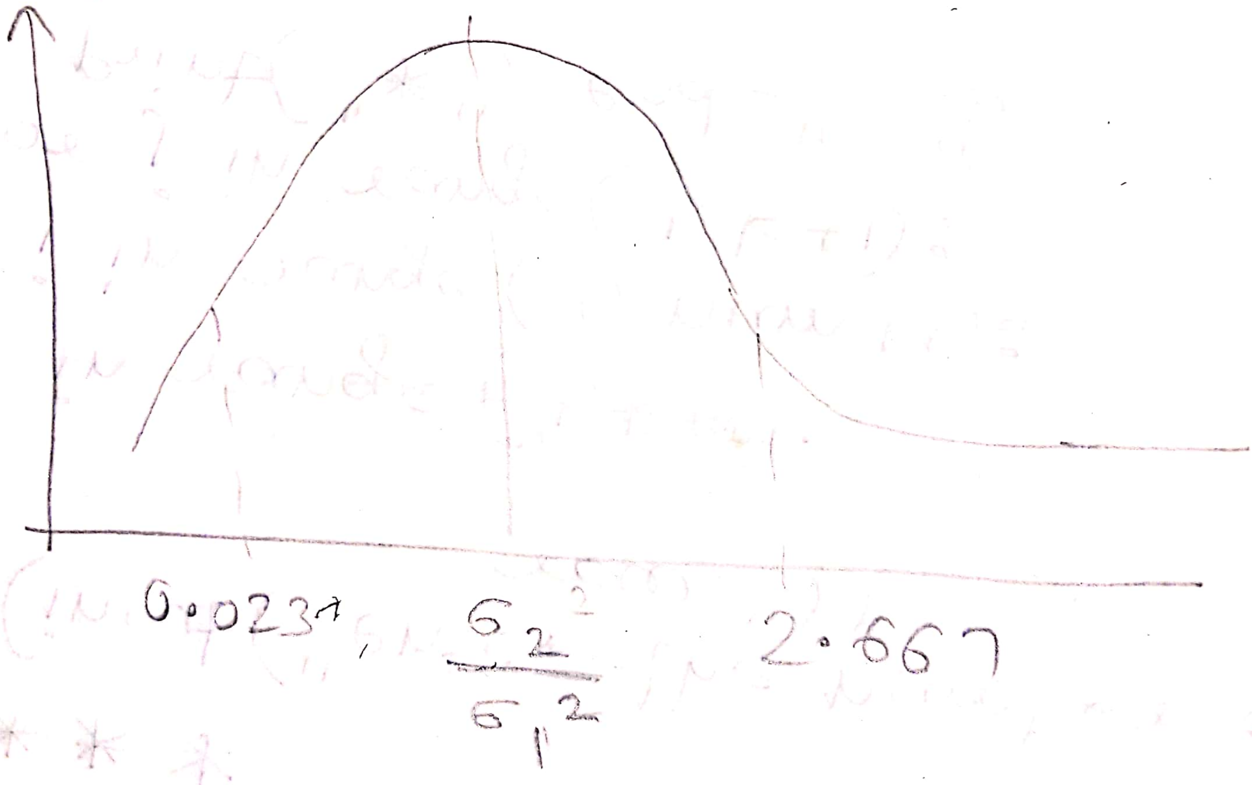
$$\frac{11.56}{33.64} * 0.067 \leq \text{Ratio} \leq \frac{11.56}{33.64} * 7.763$$

$$0.023 \leq \text{Ratio} \leq 2.667$$

$$0.023 \leq \frac{\sigma_2^2}{\sigma_1^2} \leq 2.667$$

Scanned by CamScanner

Q. 3) →



DATE / /

4) → Given Data:-

$n_1 = 100, \quad n_2 = 200$

(90% C.I.)

$\alpha = \frac{10}{100} = 0.01$

$\frac{\alpha}{2} = 0.05$

$x_1 = 64$

$x_2 = 96$

$\hat{p}_1 = \frac{64}{100} = 0.64$

$\hat{p}_2 = \frac{96}{200} = 0.48$

Confidence interval for $(p_1 - p_2)$ is given by

$$(\hat{p}_1 - \hat{p}_2) - Z_{\alpha/2}\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$$

$$< p_1 - p_2 < (\hat{p}_1 - \hat{p}_2) + Z_{\alpha/2}\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$$

For 90% C.I. $Z_{0.05}$ = Sp.norm.ppf(0.05)

$= 1.644$

$$0.16 - 1.644\sqrt{\frac{0.64 \times 0.36}{100} + \frac{0.48 \times 0.52}{200}}$$

$$< p_1 - p_2 <$$

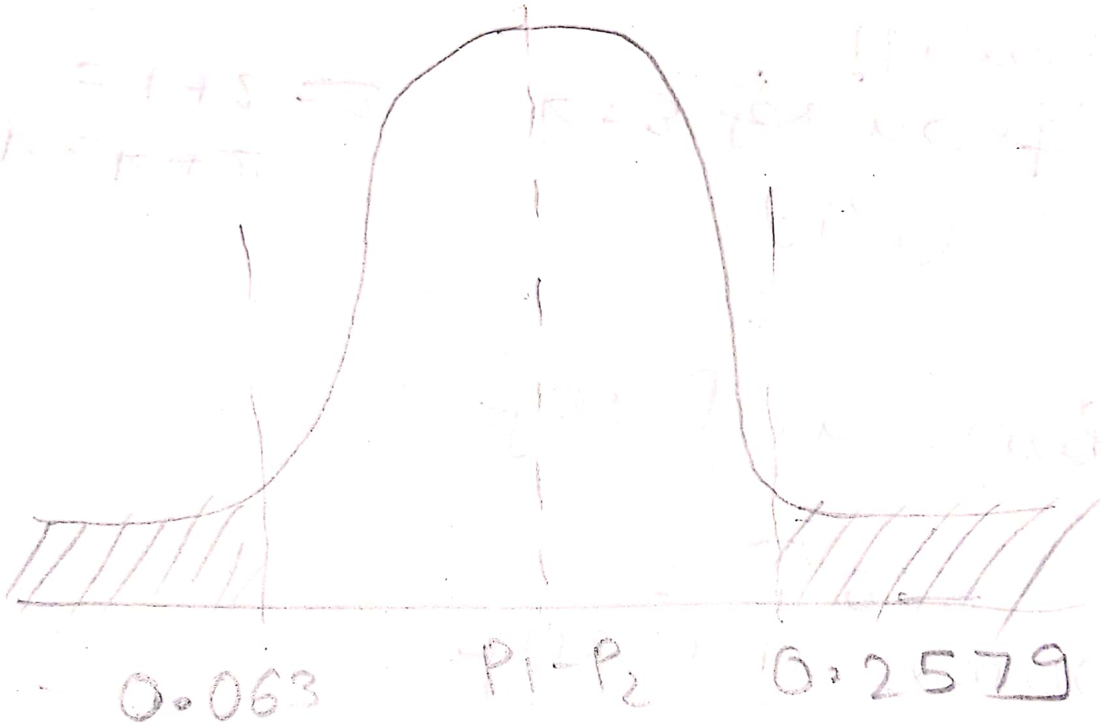
$$0.16 + 1.644\sqrt{\frac{0.64 \times 0.36}{100} + \frac{0.48 \times 0.52}{200}}$$

DATE / /

$$0.16 - 0.097 < P_1 - P_2 < 0.16 + 0.097$$

$$0.063 < P_1 - P_2 < 0.2579$$

Q.4) →




Scanned by CamScanner