Tost of signebicance for Debberence ab Means:

Let X, be the mean of a sample at size on, brown a population with mean il, and variance of and & be the mean of an independent random complete size no born another population with mean 42 and variance 62. Then since sample sizes are large,

I, ~ N/U, 5,2) and Iz ~ N/U, 52

Also X, -x, being the debberence ab two independent normal variates is also a normal variate. Then I (standard normal variate) corresponding to x, -x, is given by

 $Z = (\overline{X}_1 - \overline{H}_2) - F(\overline{X}_1 - \overline{H}_2)$ S. F (X1 - H2)

S. E stands for standard error

(=(X1-N2)=E(X1)-E(X2)=U1-42=0 $V(\overline{x}_1 - \overline{x}_2) = V(\overline{x}_1) + V(\overline{x}_2) = \frac{\sigma_1^2}{h} + \frac{\sigma_2^2}{h}$

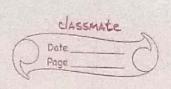
Thus under the null hypothesis. Ho: 11, = 42 the test statistics becomes [bor large samples)

$$Z = \overline{x_1 - \overline{x_2}}$$

$$\sqrt{\frac{6^2}{7} + \frac{6^2}{7}} \sim N(0,1)$$

(3) the means of two single large samples ab 1000, and 2000 members are 67.5 inches and 68.0 inches respectively. Can the samples be regarded as drawn brown the same population of standard denation 2. 5 forchis? Toyl at 5% level of significance.

Sol :- Green, n = 1000, n2 = 2000 $\overline{n}_1 = 67.5$ inches, $\overline{n}_2 = 68.0$ inches Null hypothesis Ho: 41=42 and 6=2.5 inches, 1e the samples have been drawn brown the same population of standard devation 2.5 inchis-Alternature heppothesis; H, : U, Fly (Two failed) Trest statistics, Under Ho, the test statistics is $Z = \overline{x_1 - x_2} = \frac{67.5 - 68.0}{\left[62.5 \right]^2 \left(\frac{1}{1000} + 1 \right)}$ = -0.5 = -0.5 = -5.1 $2.5 \times \sqrt{\frac{1}{1000} + \frac{1}{2000}} = -5.1$ 12/73 The calculated I is highly significant and we reject the nell hypothesis and conclude that camples are confainly not brom the same population conthe standard deviation 2.5 caches. Remark O En the above problem = 0,2=02=02, i.e. it the Sampley have been dracers troops the populations certh Common S.D & then under Ho: l1 = 42 Z= -X1-X2 61/ 1/2 (2) If 6,2 + 62 and 6, and 62 are unknown, then they are estimated . 60000 cample values. This result ca some error, which is practically immaterials et cample ære large.



These estimates by large samples are given by $\hat{G}_1 = S_1^2 \approx S_1^2$ and $\hat{G}_2^2 = S_2^2 = S_2^2$ (for samples are large)

 $Z = \overline{\chi_1 - \overline{\chi_2}}$ $\sqrt{\frac{x_1^2 + x_2^2}{\eta_1 + \eta_2}}$

Ex(2) In a survey of buying habits, too women shoppers are chosen at random in super market A located in a certain section at the city. Their average weekly tood expendeture is he as so with a standard deviation at his to. For too women shoppers chosen at random in sufer market B' in another section at the city; the average weekly tood expenditure is he save with a standard denation at his 55. Test at 1% level cet significance whether the average weekly tood expenditure is helper cet

 S_{1} $\eta_{1} = 400$, $\overline{\chi}_{1} = 250$, $S_{1} = 40$ $\eta_{2} = 400$, $\overline{\chi}_{2} = 220$, $S_{2} = 55$

Null hypothesis Ho: U1= 42 ce, the grange weekly bood expendetures at the two populations of shoppers are equal.

Alternative hypothesis H: 4: 4: 42

(Two texted)

 $\frac{\overline{\chi_1 - \chi_2}}{\sqrt{\frac{6_1^2}{\gamma_1} + \frac{6_2^2}{\gamma_2}}}$

Since 6/2 and 6/2 are not known, we can take 6/2 = 8/2 and 6/2 = 8/2

 $Z = \frac{\overline{\chi_1 - \chi_2}}{\sqrt{\frac{8^2}{\eta_1} + \frac{8^2}{\eta_2}}} =$ (4092 + CST)2 400 + 400 $= \frac{30 \times 20}{\sqrt{40^2 + 55^2}} = \frac{8.82}{}$ Calculated, 1217 2.58 Null hypothesis is rejected So average & expendeture at two populations at shoppers in market A and market B debter signebicantly. (3) The average hously wages at a sample at 150 workers on plant of was Rs 2.56 with a standard deviation ab Rs 1.08. The average hously wage at a sample at 200 workers in plant B was Rs 2.87 centra a standard denation at Rs 1.28 Can an applicant sabely assume that hously wages paid by plant B' are higher than those paid by plant B'? S_{2} = $n_{1} = 150$, $\overline{\chi}_{1} = 2.56$, $S_{1} = 1.08$ 72 = 200, $\overline{7}_2 = 2.87$, $8_2 = 1.28$ Neel hypothesis: Ho: 4, = 42, there is no signebigin plant A and plant B. Alternative hypothesis H,; M, < 42 $Z = \chi_1 - \chi_2$ 2.56-2.87 $\int \frac{(1.08)^2}{150} + \frac{(1.28)^2}{200}$ 1 Bi + Bi 12