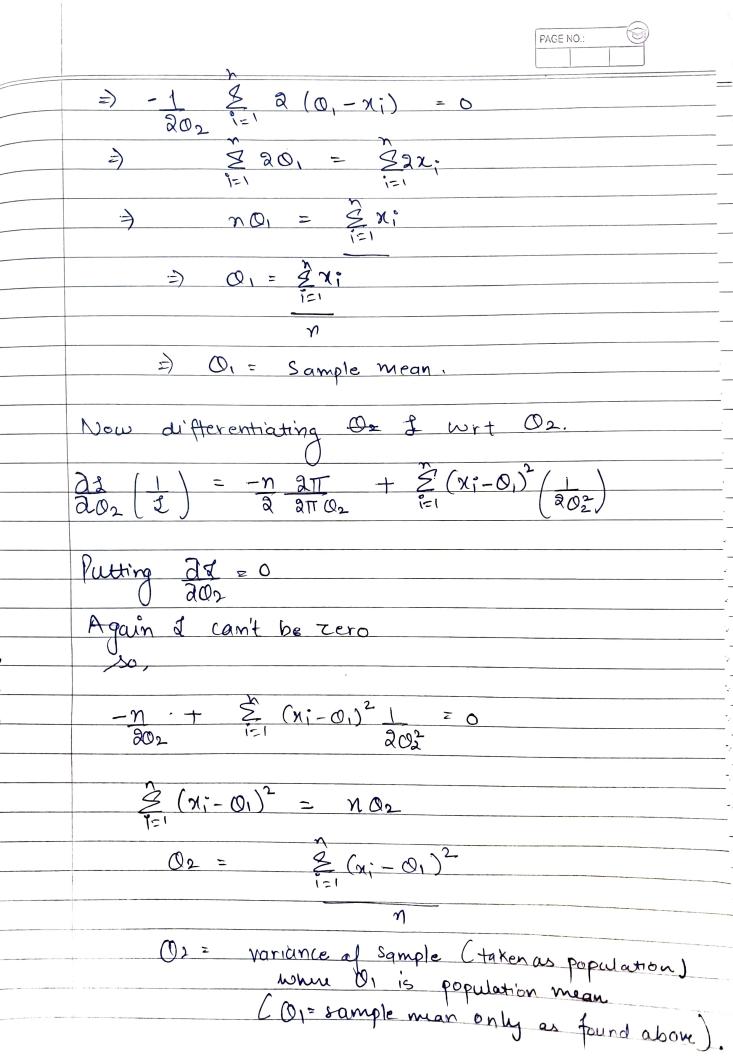
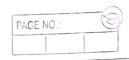


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	Batch 3CS7
	Date 20th April, 2024
	Assignment Parameter Estimation
	Assignment Parameter Estimation Subject UCS654
lus1	Let (X1, X2,) be a random sample of size m taken from a Normal Population with parameters
	n taken from a Normal Population with parameters
	mean = 0, and variance = 02.
	Find the Maximum Likelihood Estimates of these two
	parameters.
	Demosta
oln:	PDF (Probability Mass function) of Normal
	PDF (Probability Mass function) of Normal Distribution is given by
	0 -1 (2-01) 2
	$f(\chi) = \frac{1}{\sqrt{0_2} \sqrt{2\pi}} e^{-\frac{1}{2} \left(\frac{\chi - 0_1}{\sqrt{0_2}}\right)^2}$
	$\sqrt{O_2}\sqrt{2\pi}$
	where $O_2 = \Gamma^2$
	$O_1 = V$
	where x is value of random Variable X.
	Acc. to question X1 Xn are random values
	from the distribution, which makes likelihood
	function as follows
	$\frac{1}{\sqrt{1-\frac{1}{2}}} \left(\frac{\chi_{0}^{2}-Q_{1}}{\sqrt{1-\frac{1}{2}}} \right)^{-1}$
	V = 11
1	$ \frac{1}{\sqrt{2\pi}} = \frac{-1}{\sqrt{2\pi}} \left(\frac{\chi_{i}^{2} - Q_{i}}{\sqrt{2}} \right)^{2} $

where I is function of 0,02, given x:

Taking Log on both sides $\log (\mathcal{I}) = \log \left(\sqrt{2 \pi \alpha_2} \right) = \left(\frac{-1}{1 + 1} \left(\frac{\alpha_i - \alpha_1}{2} \right)^2 \right)$ $dog(J) = -n (og(2\pi02) + (-1) \stackrel{\sim}{2} (x; -0)^2$ [Using Property log(AB)=
logA+logB Differentiations on both side with respect to Or $\frac{1}{2} \frac{21}{20} = \frac{1}{202} \sum_{i=1}^{\infty} 2(x_i^2 - 0_i)(-1)$ $\frac{1}{2} \frac{\partial f}{\partial Q_1} = \frac{1}{2Q_2} \frac{2}{1=1} \frac{2}{2(x_1 - Q_1)}$ Equations de = 0 $= \frac{1}{202} \frac{1}{100} \frac{1}{100} \frac{1}{100} \frac{1}{100} = 0$ Either J = 0or J = 2 $2(x_1 - 0_1) = 0$ 202 = 1 J = 0 con't be possible as probability density of otherway happened can't be zero.





Quest Let X, X1 ... , Xn be a rardom sample from B(m,0) distribution where $O \in (0,1)$ is unknown and m is a known positive integer compute value of O using the MLE. Soln: PMF (Probability Mass function) of B (m.O). P.e.,
Binomial distribution would be $P(X=k) = m O^{k} (1-0)^{m-K}$ Where K represents number of success out of m. Let XI... Xn be random sample from B(m,0) dist.
where for a X; , it represents number of
successes. In i-th trial of experiment. So likelihood function becomes $I(0) = \prod_{i \ge 1}^{n} m_{C_{\chi_{i}}} O^{\chi_{i}} (1-0)^{m-\chi_{i}}$ Taking Loganithm on both sides Log L = Log (TTi=1 mcx; 0xi (1-0)m-xi) dog d = \(\frac{1}{i-1} \) \log \(\text{log m}_{\text{2i}} + \text{1. \log (1-0)} \] Per-forming differentiation wrt O and equating to Zero $\frac{1}{2} \frac{dz}{d0} = \frac{1}{2} \frac{2}{2} x_0 - \frac{1}{1-0} \frac{2}{1-0} \frac{(m-x_i)}{1-0}$

