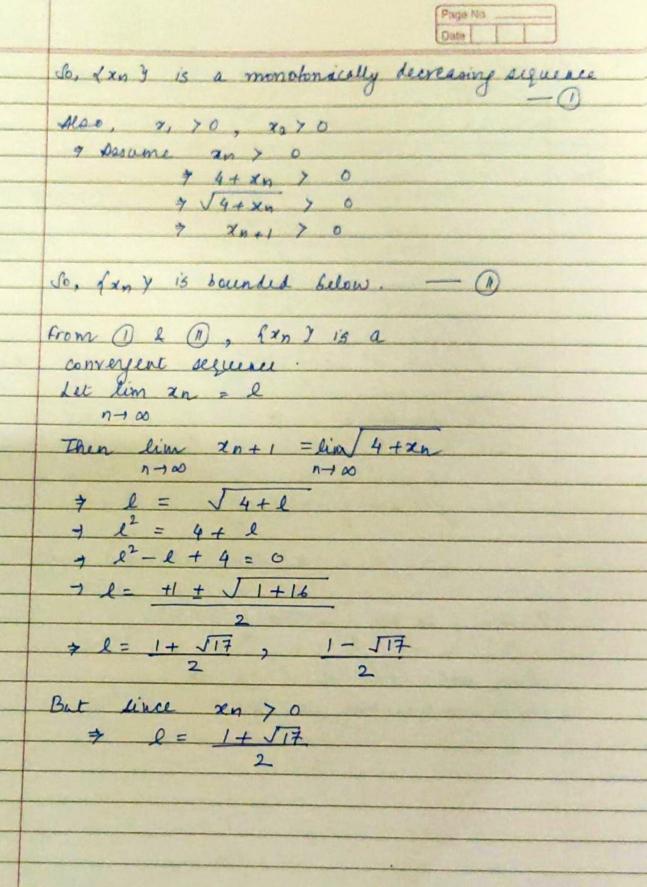
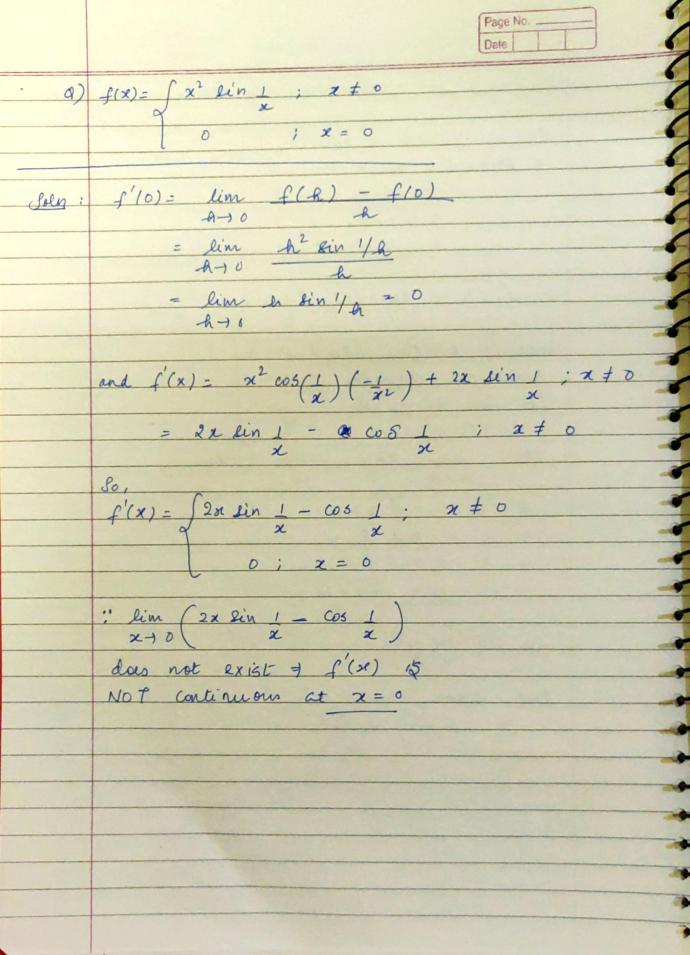
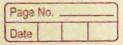
	CSE-Real Analysis - 2010 Page No Date					
Q)	Discuss the conversence of fxn y					
,	Discuss the convergence of dxn y $x_n = \frac{\sin nx}{2}$					
	2					
	8					
John:	Let us calculate the limit point of xn					
	$\lim_{n\to\infty} x_n = \begin{cases} 1 & \text{if } n=1,5,\ldots,4n+1 \\ 8 & \text{if } n=1,\ldots,4n+1 \end{cases}$					
	n→∞					
	0; n = 0, 2,, 2n					
	$\frac{-1}{8}; m = 3, 7, \dots, 2n+3$					
	Since L'an 4 down't converge to a					
	Since d'an 4 down't converge to a unique limit point 7 (an 4 is NOT convergent					
8)	Show that Ixn y where					
	x ₁ = 5					
	$2n+1 = \sqrt{4+xn} ; ny1$					
	converges to 1+ JIF.					
	2					
	•					
John:	x ₁ = 5					
	$\chi_2 = \sqrt{4+5} = 3$					
	So x2 < x,					
	Assume $x_n > x_{n+1}$					
	7 4+×n 7 4+2n+1					
	7 J4+xn > J4+xn+					
	> 2n+1 > 2n+2					
	So, 2n+1 > 2n+2 (by induction)					

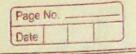




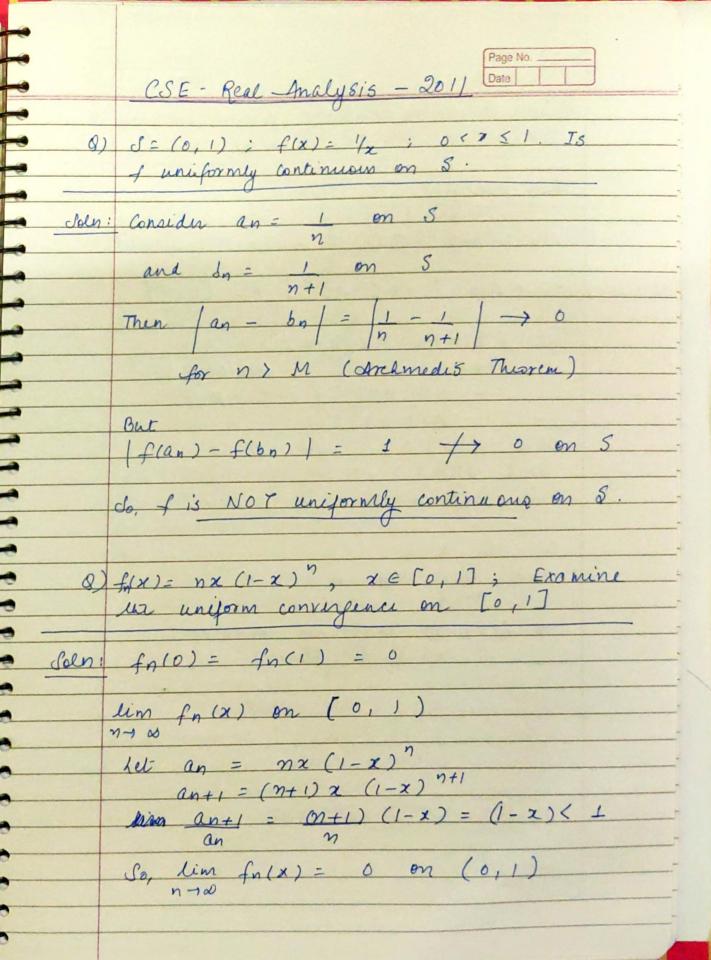


Q) Consider $\sum_{n=0}^{\infty} \chi^2$ $n=0 (1+\chi^2)^n$ Find values of x for which it is convergent and also the sum function. Is we Convergence uniform? Then $a_{n+1} = \frac{\chi^2}{(1+\chi^2)^{n+1}}$ $\lim_{n\to\infty} \frac{a_n}{a_{n+1}} = \frac{\chi^2}{(1+\chi^2)^{n+1}} \times \frac{(1+\chi^2)^{n+1}}{\chi^2}$ For convergence: $1+x^2 > 1 \neq x^2 > 0$ which is true for all values of x

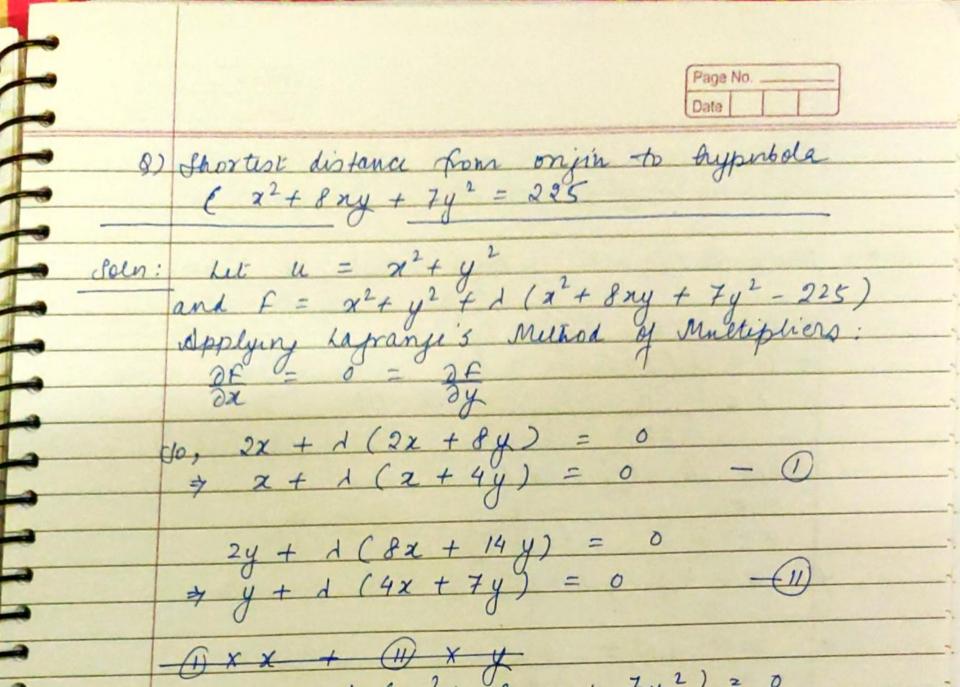
\(\neq \text{ It converges for } \times = \text{IR}.

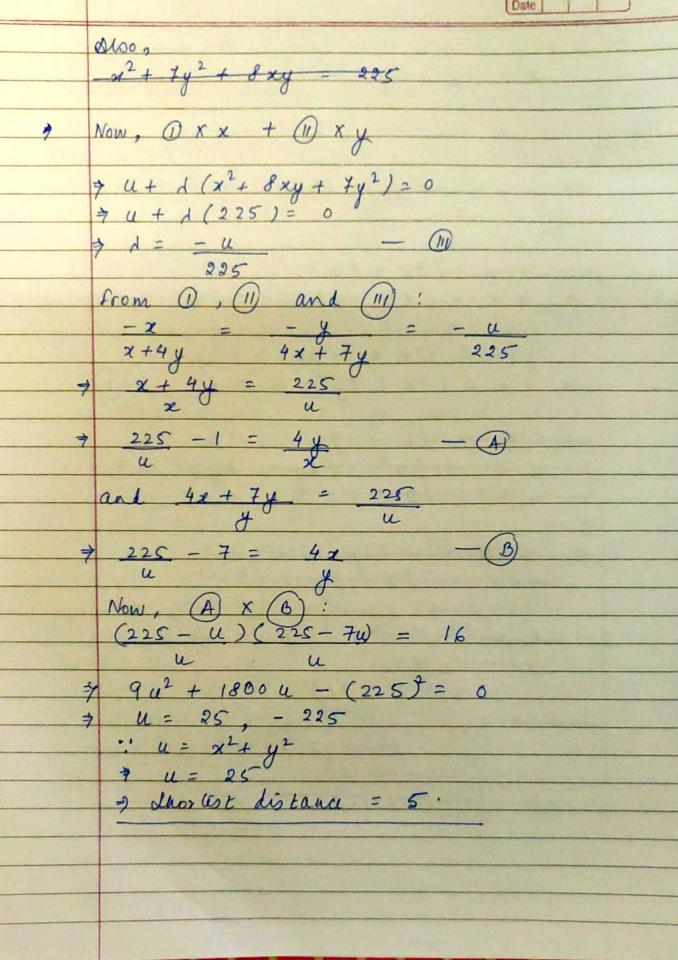


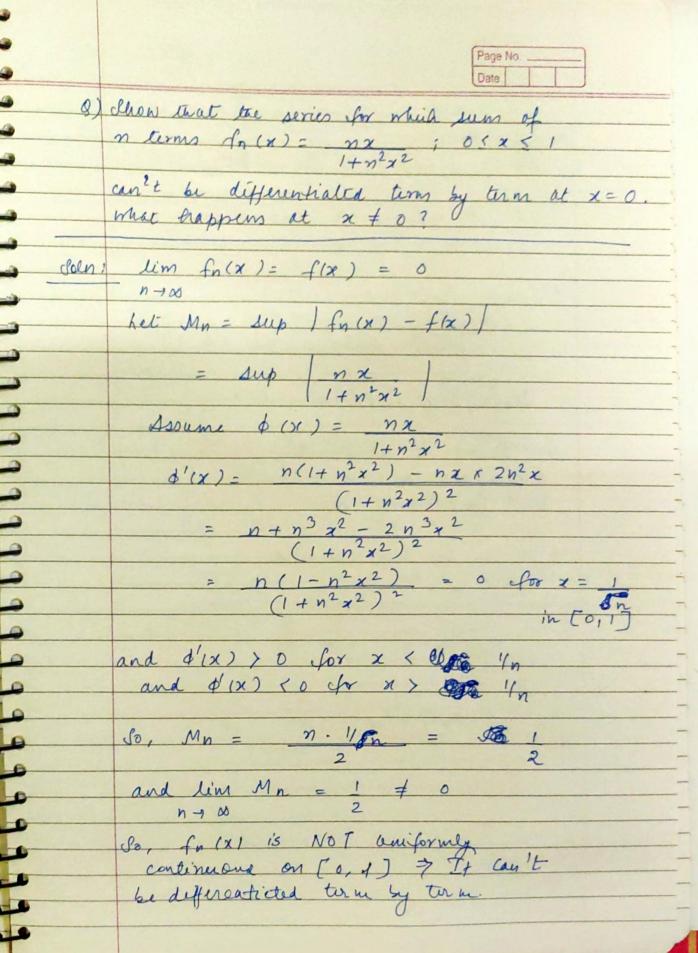
Now. $\int n(x) = (1+x^2)^n - 1$ $(1+x^2)^{n-1}$ $\lim \, \mathcal{S}_{n}(x) = 0 \; ; \; z = 0$ $n \rightarrow \infty$ $\lim_{n\to\infty} \frac{(1+x^2)^n}{(1+x^2)^{n-1}}; x \neq 0$ = lim (1+x2); x ≠ 0 = 1+x2; x f 0 So, $S(x) = \lim_{n \to \infty} S_n(x) = \begin{cases} 0; x = 0 \\ 1+x^2; x \neq 0 \end{cases}$ which is discontinuous y Convergence is NOT uniform. 8) for(x) = xn; -1 < x < 1. Find the limit function. Is the convergence uniform? Soln: $f(x) = \lim_{n \to \infty} f_n(x) = \begin{cases} 0 ; x \in (-1, 1) \\ 1 ; x = 1 \end{cases}$ for the convergence to be uniform, the limit function f(x) must be continuous, which is not the case here * Convergence is NOT uniform.



So, the sointwise limit f(xe) = 0 on (0,17) Then applying Mn Test:
So, the pointwise limit
f(x) = 0 on $f(0,1)$
 Then applying Mn Test:
 1 1 0 1 0 1 1 mg [- 17
$Mn = \sup f_n(x) - f(x) $ on $[0,1]$
= sup nx (1-x)" on [0,1]
1. r 6 h(x) = nx (1-x)
$\phi'(x) - \eta(1-x)' + \eta \chi(1-x)'$
$= n(1-x)^{n-1} [1-x+x]$ $= n(1-x)^{n+1}$
= m(1-x)"
Then $\phi'(x) = 0$ for $x = 1$
and $\phi'(x) > 0$ on $[0,1]$ do, sup $n \times (1-x)^n = 0$
So, Sup $n \times (1-x)^n = 0$ So, $Mn = 0$ and $\lim_{n \to \infty} Mn = 0$
So, Mn = 0
and lim Mn 20
n - 1 W
onvergent Convergent
, 0







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on $x \in (0,1]$

 $\frac{1}{1+n^2e^2}$ where $e \rightarrow 0$ on (0,1]

> Mn = Sup fn(x) = 0

convergent on an interval NOT containing zero.

of It can be differentiated term by term.

