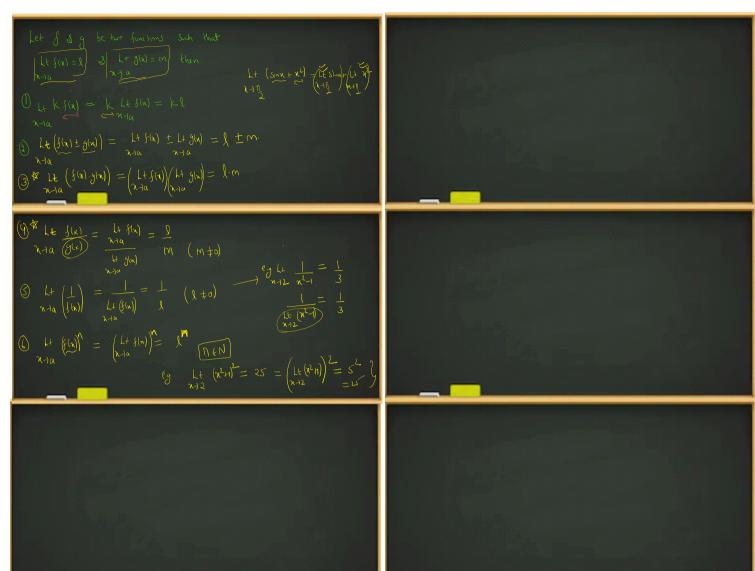
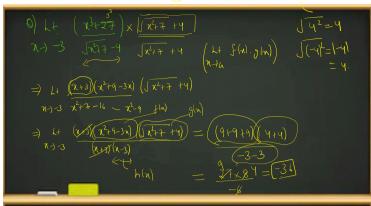
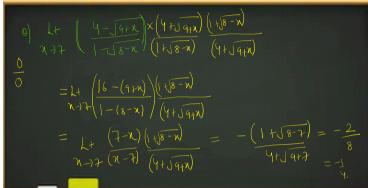
## ALGEBRA OF LIMITS:







0) L+ 
$$\left(\frac{1}{(n-2)} - \left(\frac{4}{n^3 - 2x^2}\right)\right)$$
  
A) 0  $\left(\frac{(00-00)}{3}\right)$  L+  $\frac{\chi^3 - 2\chi^3 - 4(x-2)}{(x-2)(x^2)(x-2)}$   
B) 2  $\frac{\chi^3 - 2\chi^3 - 4(x-2)}{(x-2)(x^2)(x-2)}$   
 $= \frac{1}{(x^2-4)(x-2)}$   $= \frac{1}{(x-2)(x+2)}$   
D) does not exist  $= \frac{4}{4} = 0$ 

(8) Lt 
$$\left(\frac{1}{\chi^{2}+\chi-2} - \frac{\chi}{\chi^{3}-1}\right)$$
 (80-8)  
A)  $\frac{1}{3} \frac{1}{\chi+1} \left(\frac{1}{\chi-1}(\chi+1) - \frac{\chi}{\chi-1}(\chi+1)\right) = \frac{1}{\chi-1} \left(\frac{1}{\chi+1} - \frac{1}{\chi+2}\right)$ 
B)  $\frac{1}{9} \frac{1}{\chi+1} \left(\frac{1}{\chi-1}\right) \left(\frac{\chi^{2}+\chi+1}{\chi-1} - \chi^{2}-2\chi\right)$ 
C)  $\frac{1}{9} \frac{1}{\chi+1} \left(\frac{1}{\chi-1}\right) \left(\frac{\chi^{2}+\chi+1}{\chi-1} - \chi^{2}-2\chi\right)$ 
D)  $\frac{1}{3} = \frac{1}{\chi+1} \left(\frac{\chi-1}{\chi-1}\right) \left(\frac{\chi+1}{\chi+2}(\chi^{2}+\chi+1)\right) = \frac{1}{\chi+1} - \frac{1}{(\chi+1)}(\chi+2)(\chi^{2}+\chi+1)}$ 
 $\frac{1}{3} \frac{1}{\chi+1} \left(\frac{\chi-1}{\chi-1}\right) \left(\frac{\chi-1}{\chi+2}(\chi^{2}+\chi+1)\right) = \frac{1}{\chi+1} - \frac{1}{(\chi+1)}(\chi+2)(\chi^{2}+\chi+1)} = \frac{1}{3\chi-3} = \frac{1}{3}$ 

## SOME IMPORTANT EXPANSIONS

In finding limits, use of expansions of following functions are useful:

þ

(1) 
$$(1+x)^n = 1 + nx + \frac{n(n-1)}{x^2} x^2 + \dots$$

(2)  $a^x = 1 + x \log a + \frac{(x \log a)^2}{2!} + \dots$ 

ł

(3) 
$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$$

(4)  $\log(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots |x| < 1$ 

$$(5)_{\log(1-x)=-x-\frac{x^2}{2}-\frac{x^3}{3}-\frac{x^4}{4}-..., \text{ where } |x|<1$$

(6) 
$$(1+x)^{\frac{1}{x}} = e^{\frac{1-\frac{x}{2}+\frac{x^2}{3}}{2}} \dots = e^{\left(1-\frac{x}{2}+\frac{11}{24}x^2 - \dots\right)}$$

(7) 
$$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \dots$$

(8) 
$$\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \dots$$

(9) 
$$\tan x = x + \frac{x^3}{3} + \frac{2x^5}{15} + \dots$$

$$(10 \sin^{-1} x = x + 1^2 \cdot \frac{x^3}{3!} + 3^2 \cdot 1^2 \cdot \frac{x^5}{5!} + \dots$$

(11) 
$$\cos^{-1} x = \left(\frac{\pi}{2}\right) - \sin^{-1} x$$

(12) 
$$\tan^{-1} x = x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \dots$$

## TRIGONOMETRIC LIMITS:

