Q.4 (1)

$$\frac{(x-5)(x-6)}{(x-7)}(x^{1/2}) + \ln(8x) = f(x)$$

We will make three parts—

$$\underbrace{\left[\frac{(x-5)(x-6)}{(x-7)}\right]}_{\mathrm{I}}\underbrace{\left[x^{1/2}\right]}_{\mathrm{II}} + \underbrace{\left[\ln(8x)\right]}_{\mathrm{III}}.$$

$$\mathrm{I} = \frac{\left[(x,1)-(5,0)\right]\left[(x,1)-(6,0)\right]}{\left[(x,1)-(7,0)\right]}.$$

$$= \left[\frac{\overset{a}{(x-5},\overset{a'}{1)}\overset{b}{(x-6},\overset{b'}{1)}}{(x-7,1)}\right]$$

$$= \left[(x-5)(x-6), (x-6)+(x-5)\right] \Big/ \left[(x-7),1\right]$$

$$= \frac{(\overset{a}{\{x-5\}\{x-6\}}, \overset{a'}{2x-11}).}{(\underset{b}{\{x-7\}}, \underset{b'}{1})}$$

$$= \left(\underset{a}{\frac{\{x-5\}\{x-6\}}{\{x-7\}}}, \underset{a'}{\frac{\{2x-11\}\{x-7\} - \{x-6\}\{x-5\}}{\{x-7\}^2}}\right)$$

$$\mathrm{II} = \left(\overset{b}{x^{1/2}}, \overset{b'}{\frac{1}{2}x^{-1/2}}\right) \quad \Big| \quad \mathrm{III} = \left(\ln(8x), \frac{1}{x}\right)$$

$$(\mathrm{I})(\mathrm{II}) = \left(\left[\frac{\{2x-11\}\{x-7\} - \{x-6\}\{x-5\}}{\{x-7\}^2}\right]x^{1/2} + \left[\left\{\frac{1}{2}x^{1/2}\right\}\frac{\{x-5\}\{x-6\}}{\{x-7\}}\right], \frac{\{x-5\}\{x-6\}}{\{x-7\}}\{x^{1/2}\}\right)$$

ordering should be reversed here.

(a, b)

Page No.

Date

If we add all the terms —

$$\left(\frac{(x-5)\{x-6\}(x^{1/2})}{\{x-7\}} + \ln(8x) , \right.$$

$$\left. \frac{[\{2x-11\}\{x-7\} - \{x-6\}\{x-5\}]x^{1/2}}{\{x-7\}^2} + \left\{\frac{1}{2}x^{-1/2}\right\}\frac{\{x-5\}\{x-6\}}{\{x-7\}} + \frac{1}{x} \right)$$

$$= \left(\left(f(x) , f'(x)\right)\right)$$

(Q.4) (2)

Put $x=4$

$$f(x) = \frac{(4-5)(4-6)\sqrt{4}}{(4-7)} + \ln(4\times 8).$$

$$= \frac{(-1)(-2)2}{-3.} + \ln(32).$$

This not cut

$$= \frac{-4}{3} + 3.46 = 2.13$$

$$\cancel{f'(x) = \left(\frac{\{8-11\}\{4-7\} - \{4-6\}\{4-5\}}{\{4-7\}^2}\right)\sqrt{4} + \frac{1}{2\sqrt{4}}\frac{\{4-5\}\{4-6\}}{\{4-7\}} + \frac{1}{4}}$$

$$f'(x) = \left(\frac{9-2}{9}\right)2 + \frac{1}{4}\left(\frac{1}{3}\right).$$

$$= \frac{-14}{9} + \frac{1}{12} = 1.639$$

Q5 1

$f(x) = \frac{1 - \cos(x)}{x^2}$.

Put $x=0$ | $f(0) = \frac{1-1}{0} = \frac{0}{0}$ (Indefinite).

L'Hopital Rule

$\frac{1+\sin x}{2x}$ | at $x=0$ | $\frac{1+0}{0} = \frac{1}{0}$ form

L'Hopital Rule

$\frac{\cos x}{2}$ | at $x=0$ | $f(0) = \frac{1}{2}$

Q5 (2) (3)

We use identity -

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

$$f(x) = \frac{\cancel{1} - \cancel{1} + 2\sin^2(x/2)}{(x/2)^2}$$

$$= \frac{2\sin^2(x/2)}{x^2}.$$

$$= 0.5\ \frac{\sin^2(x/2)}{(x/2)^2}.$$

No, cancelation in numerator.

Q5. 7

$$g(x) = 0.5 \frac{\sin^2(x/2)}{(x/2)}.$$

$$= 0.5 \left[\frac{\sin(x/2)}{(x/2)}\right]^2.$$

$$\lim_{x \to 0} g(x) = 0.5 \left[\lim_{x \to 0} \frac{\sin(x/2)}{(x/2)}\right]^2.$$

$$= 0.5 [1]^2.$$

So we get,

$$g(0) = 0.5$$