Saved Photos

NAME: TOWURU Jesutofunmi N
MATRIC NO: 18/ENG02/095
DEPT: COMPUTER ENGINEERING
COLLEGE: ENGINEERING.

(1) $y = \dfrac{(x+1)^2 (x-2)^{1/2}}{(2x-1)(x-3)^{3/2}}$

$\ln y = [\ln (x+1)^2 + \ln (x-2)^{1/2}] - [\ln(2x-1) + \ln (x-3)^{3/2}]$

$\frac{1}{y} \cdot \frac{dy}{dx} - \left[\frac{1}{(x+1)^2} \cdot 2(x+1) + \frac{1}{(x-2)^{1/2}} \cdot \frac{(x-2)^{1/2}}{2}\right]$

$- \left[\frac{1}{(2x-1)} \cdot 2 \; \frac{1}{(x-3)^{3/2}} \cdot \frac{3(x-3)^{1/2}}{2}\right]$

$= \frac{1}{y} \cdot \frac{dy}{dx} = \left[\frac{2(x+1)}{(x+1)^2} + \frac{(x-2)^{-1/2}}{2(x-2)^{1/2}}\right] - \left[\frac{2}{(2x-1)} + \frac{3(x-3)^{1/2}}{2(x-3)^{3/2}}\right]$

$\frac{1}{y} \cdot \frac{dy}{dx} = \left[\frac{2}{(x+1)} + \frac{1}{2(x-2}\right] - \frac{2}{2x-1} - \frac{3}{2(x-3)^2}$

$\frac{dy}{dx} = \frac{\cancel{(x+1)}^2 (x-2)^{1/2}}{(2x-1)(x-3)^{3/2}} \left[\frac{2}{x+1} + \frac{1}{2(x-2} - \frac{2}{2x-1} - \frac{3}{2(x-3)}\right]$

(2) differentiate $y = [3e^x \sin 2x] / [x^{5/2}]$

Solution

$\ln y = \ln 3e^x + \ln \sin 2x - \ln x^{5/2}$

$\frac{d}{dx}(\ln y) = \frac{d}{dx}(3e^x) + \frac{d}{dx}(\ln \sin 2x) - \frac{d}{dx}(\ln x^{5/2})$

$\frac{1}{y} \frac{dy}{dx} = \frac{1}{3e^x} \cdot (3e^x) + \frac{1}{\sin 2x} \cdot \cos 2x - \frac{1}{x^{5/2}} \cdot \left(\frac{5}{2} x^{3/2}\right)$

$\frac{1}{y} \frac{dy}{dx} = \frac{3e^x}{3e^x} + \frac{\cos 2x}{\sin 2x} - \frac{\frac{5}{2} x^{3/2}}{x^{5/2}}$

multiply both sides by y.

$$dy/dx = y\left(\frac{3e^x}{3e^x} + \frac{\cos 2x}{\sin 2x} - \frac{5/2\, x^{3/2}}{x^{5/2}}\right)$$

$$dy/dx = y\left(1 + \frac{\cos 2x}{\sin 2x} - \frac{5/2\, x^{3/2}}{x^{5/2}}\right)$$

$$\frac{dy}{dx} = \frac{3e^x \sin 2x}{x^{5/2}}\left(1 + \frac{\cos 2x}{\sin 2x} - \frac{5/2\, x^{3/2}}{x^{5/2}}\right)$$

(3)

Integration

(1) $4\sec^2(3m+1)$

$u = 3m+1$

$du = 3dm$

$dm = du/3$

$\int 4\sec^2 u \, du/3$

$4/3 \int \sec^2 u\, du$ integration of $\sec^2 u = \tan u + C$

$4/3 \tan u + C$

$4/3 \tan(3m+1) + C$

(2) $2t(3t^2-1)^{1/2}$

$u = 3t^2 - 1$

$\int 2t \cdot (3t^2-1)^{1/2}$

$du/6t = \frac{\cancel{6t}\, dt}{\cancel{6t}}$

$dt = du/dt$

$\int \cancel{2t} \times (u)^{1/2}\, du/\cancel{6t}\ 3$

$\int 1/3 \times u^{1/2}\, du$

$= 1/2 \times \frac{u^{1/2}}{1/2+1} + C \quad = 1/3 \times 2/3\, u^{3/2} + C$

$= 2/9\, U^{3/2} + C$

$= \frac{2}{9}(3t^2-1)^{3/2} + C$

③ Integrate

$2x/4(4x^2-1)^{1/2}$

Solution.

$\int \frac{2x}{(4x^2-1)^{1/2}} = \int 2x(4x^2-1)^{-1/2}\,dx$

$U = 4x^2-1$

$du = 8x\,dx$

$dx = du/8x$

$dx = du/8x$

$= \int 2x(u)^{-1/2}\,du/8x$

$= 1/4 \int U^{-1/2}\,du$

$= 1/4 \times \frac{U^{-1/2+1}}{-1/2+1}$

$= 1/4 \times U^{1/2}/_{1/2}$

$= 1/4 \times 2U^{1/2} = 1/2\,U^{1/2}$

$= 1/2\,U^{-2}$

$= \frac{1}{2}(4x^2-1)^{1/2}$

$+C$