IFEOLUWA PROMISE . SERIAL NO. 182.

19/ENG02/021

COMPUTER ENGINEERING.

MAT 104

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

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

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

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

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

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

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

2.) $Y = [3e^x \sin 2x] / [x^{5/2}]$

find the Cos of both Sides.

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

diff. with respect to x.

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

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

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

Multiply both sides by y.

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

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

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

Integrate the following with respect to variable.

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

$u = 3m+1$

$du = 3dm$

$dm = du/3$

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

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

Integration of $\sec^2 u = \tan u + c$.

$4/3 \tan u + c$.

$4/3 \tan(3m+1) + c$.

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

$u = 3t^2 - 1$

$\frac{du}{6t} = \frac{6t}{6t} dt$.

$dt = du/6t$

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

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

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

$= 1/3 \times \frac{u^{1/2+1}}{1/2+1} + c$.

$= 1/3 \times 2/3 u^{3/2} + c$

$= 2/9 u^{3/2} + c$

$\Rightarrow 2/9 (3t^2-1)^{3/2} + c$.

3) $2x/(4x^2-1)^{1/2}$

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

$u = 4x^2 - 1$

$du = 8x\,dx$

$dx = \frac{du}{8x}$

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

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

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

$= 1/4 \times \frac{u^{1/2}}{1/2}$

$= 1/4 \times 2u^{1/2}$

$= 1/2 u^{1/2} = 1/2 (4x^2-$