IBRAHIM ODAGIBEAGEH MAT NO: 19/ENG03/012 ATT NO: 183

CIVIL ENGINEERING

1. $y = \frac{(2x^2+3)}{\ln 2x}$

$\ln y = \ln(2x^2+3) - \ln(\ln 2x)$

$\frac{1}{y} \cdot \frac{dy}{dx} = \frac{1}{2x^2+3} \cdot 4x - \frac{1}{\ln 2x} \cdot \frac{2}{2x}$

$\frac{dy}{dx} = \frac{(2x^2+3)}{\ln 2x}\left(\frac{4x}{2x^2+3} + \frac{1}{x \ln 2x}\right)$

When $x = 2.5$, $\frac{dy}{dx} = \frac{2(2.5)^2+3}{\ln 2(2.5)}\left(\frac{4(2.5)}{2(2.5)^2+3} - \frac{1}{2.5 \ln(2.5)2.5}\right)$

$= 3.82$ to 35.f.

2. $y = \frac{2x}{x^2-5}$

$\ln y = \ln 2x - \ln x^2 - 5$

$\frac{1}{y} \cdot \frac{dy}{dx} = \frac{1}{2x} \cdot 2 - \frac{1}{x^2-5} \cdot 2x$

$\frac{dy}{dx} = \frac{2x}{x^2-5}\left(\frac{1}{x} - \frac{2x}{x^2-5}\right)$

$= \frac{2x}{x^2-5}\left(\frac{1}{x} - \frac{2x}{x^2-5}\right)$

at $x = 2.4$ $\frac{dy}{dx} = -37.26$

3) $z = 2x^3 \ln y$

$\frac{dz}{dy} = \frac{1}{y}$

4) $\int_0^2 x(2x^2+1)^{\frac{1}{2}}\,dx = \int_0^2 x\sqrt{2x^2+1}\,dx$

let $u = 2x^2+1$

$\frac{du}{dx} = 4x$

$dx = \frac{du}{4x}$

$\int_0^2 x\sqrt{2x^2+1}\,dx = \int_0^2 x\sqrt{u}\,\frac{du}{4x} = \frac{1}{4}\int_0^2 \sqrt{u}\,du$

$= \frac{1}{4}\left[\frac{u^{\frac{3}{2}}}{\frac{3}{2}} + C\right]_0^2$

$= \frac{1}{4}\left[\frac{2(2(2)^2+1)^{\frac{3}{2}}}{3} - \frac{2(2(0)^2+1)^{\frac{3}{2}}}{3}\right]$

$= \frac{1}{4}\left[\frac{52}{3}\right]$

$= \frac{13}{3}$