Oke owo timothy 19/engg/

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

let $u = 2x^2+3$ $\quad v = \ln 2x$

$du/dx = 4x$ $\quad dv/dx = 1/x$

$$\frac{dy}{dx} = \frac{v \cdot du/dx - u \cdot dv/dx}{v^2}$$

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

$$\left.\frac{dy}{dx}\right|_{x=2.5} = \frac{4(2.5)\ln(2.5) - 1/2.5\,[2(2.5)^2+3]}{[\ln 2[2.5]]^2}$$

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

$du/dx = 2$ $\quad dv/dx = 2x$

$$dy/dx = \frac{2(x^2-5) - (2x \cdot 2x)}{(x^2-5)^2}$$

$$= \frac{2x^2-10-4x^2}{(x^2-5)^2} = \frac{2x^2-4x^2-10}{(x^2-5)^2} = -\frac{2x^2+10}{(x^2-5)^2}$$

$$\left.\frac{dy}{dx}\right|_{(2,-4)} = M = -\frac{2(2)^2+10}{[(2)^2-5]^2} = -\frac{18}{1}$$

Gradient $= -18$.

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

$u = 2x^3$ $\quad v = \ln y$

$du/dy = 6x^2$ $\quad dv/dy = 1/y$

$$\frac{dz}{dy} = 2x^3 \cdot 1/y + \ln y \cdot 6x^2 \frac{dx}{dy}$$

$$\therefore \frac{dz}{dy} = \frac{2x^3}{y} + 6x^2 \ln y \frac{dx}{dy}$$

4. $\int_0^2 x(2x^2+1)^{1/2}\,dx$

let $u = 2x^2+1$ $\quad du/dx = 4x$.

$du = 4x\,dx$.

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

$$\int_0^2 x \cdot u^{1/2} \cdot \frac{du}{4x}$$

$$1/4 \int_0^2 u^{1/2} \cdot du$$

$$\frac{1}{4}\left[\frac{u^{3/2}}{3/2}\right]_0^2 = \frac{1}{6}\left[u^{3/2}\right]_0^2$$

$$= 1/6\left[(2x^2+1)^{3/2}\right]_0^2$$

$$1/6\left[(2(2^2)+1)^{3/2} - (2(0)+1)^{3/2}\right.$$

$$= \frac{1}{6}[27-1]$$

$$= \frac{1}{6}[26]$$

$$= 4.3333 \approx \underline{4.33}$$