ALONYENU TREASURE CIVIL ENGINEERING 19/ENG03/005 MAT 104 ASSIGNMENT

Alonyenu Treasure Agbenu-owo
Civil Engineering
MAT 104 Assignment
19/ENG03/005

$$y = \frac{[(x+1)^2 (x-2)^{1/2}]}{[(2x-1)(x-3)^{4/3}]}$$

$$\ln y = \ln[(x+1)^2] + \ln[(x-2)^{1/2}] - \ln(2x-1) + \ln[(x-3)^{4/3}]$$

$$\ln y = 2\ln(x+1) + \tfrac{1}{2}\ln(x-2) - \ln(2x-1) - \tfrac{4}{3}\ln(x-3)$$

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

$$\frac{dy}{dx} = y\left[\frac{2}{x+1} + \frac{1}{2(x-2)} - \frac{2}{2x-1} - \frac{4}{3(x-3)}\right]$$

$$\frac{dy}{dx} = \frac{[(x+1)^2(x-2)^{1/2}]}{[(2x-1)(x-3)^{4/3}]}\left[\frac{2}{x+1} + \frac{1}{2(x-2)} - \frac{2}{2x-1} - \frac{4}{3(x-3)}\right]$$

$$y = \frac{3e^k \sin 2k}{k^{5/2}}$$

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

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

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

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

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

Integration

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

let $u = 3m+1$; $\frac{du}{dm} = 3$ $\therefore dx = \frac{du}{3}$

$$= \int 4\sec^2 u \cdot \frac{du}{3} = \frac{1}{3}\int 4\sec^2 u \cdot du$$

$$= \frac{1}{3}\cdot\left[4\tan u + c\right]$$

$$= \frac{4\tan u}{3} + c$$

$$= \frac{4\tan(3m+1)}{3} + c$$

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

let $u = 3t^2 - 1$; $\frac{du}{dt} = 6t$ $\therefore dt = \frac{du}{6t}$

$$= \int 2t \cdot u^{1/2} \cdot \frac{du}{6t} = \int u^{1/2}\frac{du}{3t}$$

$$\frac{1}{3}\int u^{1/2}du = \frac{1}{3}\left[\frac{u^{3/2}}{3/2} + c\right]$$

$$= \frac{2u^{3/2}}{9} + C$$

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

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

let $u = 4x^2 - 1$; $\frac{du}{dx} = 8x$ $\therefore$ $dx = \frac{du}{8x}$

$$\int \frac{2x}{u^{1/2}} \cdot dx = \int \frac{\cancel{2x}^{\,1}}{u^{1/2}} \cdot \frac{du}{\cancel{8x}_{\,4x}}$$

$$= \frac{1}{4} \int u^{-1/2} \cdot du = \frac{1}{4} \int \frac{u^{1/2}}{1/2} + C$$

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

or

$$\frac{\sqrt{(4x^2-1)}}{2} + C$$