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MTH101 Assignment No 2 (2023)

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Solution 1:

L.H.S

$$\frac{d}{dx}\sqrt{xy}=(\frac{1}{2})(xy)^{\frac{-1}{2}}*[(y+x\times\frac{dy}{dx})]$$

R.H.S

$$\frac{d}{dx}[x-2y]=1-0=1$$

Now, substitute $x=2$ and $y=8$ into the derivatives we calculated:

$$(\frac{1}{2})(2\times8)^{\frac{-1}{2}}*(8+2\times\frac{dy}{dx})=1$$

Simplifying.

$$(\frac{1}{2})(16)^{\frac{-1}{2}}*(8+2\times\frac{dy}{dx})=1$$

$$(\frac{1}{2})(\frac{1}{4})(8+2\times\frac{dy}{dx})=1$$

$$(\frac{1}{8})(8+2\times\frac{dy}{dx})=1$$

$$8+2\times\frac{dy}{dx}=8$$

$$2\times\frac{dy}{dx}=0$$

$$\frac{dy}{dx}=\frac{0}{2}$$

$$\frac{dy}{dx}=0$$

Solution 2:

$$f(x) = \int \frac{x^5}{\sqrt[3]{x^3+1}} dx$$

let

$u = x^3 + 1$

$du = 3x^2$

Rearranging this equation, we have :

$$dx = \frac{du}{3x^2}$$

Now we can substitute these values into the integral :

$$\int \frac{x^5}{\sqrt[3]{x^3+1}} dx = \int \frac{(x^2)(x^3)}{\sqrt[3]{x^3+1}}$$

$$= \int \frac{1}{3} u^{\frac{5}{3}} du$$

Now we can integrate with respect to u :

$$\int \frac{1}{3} u^{\frac{5}{3}} du = (\frac{1}{3})(\frac{3}{8}) \times u^{\frac{8}{3}} + c$$

$$= (\frac{1}{8})(u)^{\frac{8}{3}} + c$$

Finally, substituting back $u = x^3 + 1$:

$$= (\frac{1}{8})(x^{3+1})^{\frac{8}{3}} + c$$