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

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

$$\frac{1}{y}\cdot\frac{dy}{dx} = \frac{1}{(x+1)^2}\cdot 2(x+1) + \frac{1}{(x-2)^{1/2}}\cdot \tfrac{1}{2}(x-2)^{-1/2}$$

$$-\frac{1}{2x-1}\cdot 2 - \frac{1}{(x-3)^{4/3}}\cdot \tfrac{4}{3}(x-3)^{1/3}$$

$$1/y \cdot dy/dx = \frac{2(x+1)}{(x+1)^2} + \frac{1/2(x-2)^{-1/2}}{(x-2)^{1/2}}$$

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

$$\frac{1}{y}\cdot\frac{dy}{dx} = \frac{2}{(x+1)} + \frac{1}{2}\cdot\frac{1}{(x-2)^{1/2}}\cdot\frac{1}{(x-2)^{1/2}}$$

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

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

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

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

$$\frac{1}{y}\cdot\frac{dy}{dx} = \frac{2}{(x+1)} + \frac{1}{2}\cdot\frac{1}{(x-2)^{1/2}}\cdot\frac{1}{(x-2)^{1/2}}$$

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

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

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

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

$$\left. - \frac{2}{(2x-1)} - \frac{4}{3}(x-3)\right] //$$

2.)

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

Find the log of both sides

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

Differentiate with respect to k

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

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

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

Multiply both sides by y

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

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

8i) $\int 4\sec^2(3m+1)\,dm$

Let $u = 3m+1$

$\frac{du}{dm} = 3$

$du = 3\,dm$

$dm = \frac{du}{3}$

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

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

$4/3 (\tan u) + C$

$4/3 [\tan(3m+1)] + C$

4i) $\int 2t\,(3t^2 - 1)^{1/2}\,dt$

$u = 3t^2 - 1$

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

$6t\,dt = du$

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

$\int 2t \cdot [u]^{1/2} \frac{du}{6t}$

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

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

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

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

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

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

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

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

Let $y = 4x^2 - 1$

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

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

$= \int \cancel{2x} \cdot (u)^{-1/2} \cdot \frac{du}{\cancel{8x}_{4}}$

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

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

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

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

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

SORRY MA, for Submitting Late
I'm VERY SORRY