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

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

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

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

$$= 4.333 \approx 4.33$$

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1) $y = \frac{(2x^2+3)u}{\ln 2x \; v}$ at $x = 2.5$

$\frac{dy}{dx} = \frac{V\frac{du}{dx} - U\frac{dv}{dx}}{V^2}$

$U = 2x^2 + 3$

$dy/dx = 4x$

$V = \ln 2x, \; dv/dx = 1/2x$

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

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

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

at $x = 2.5$

$\frac{dy}{dx} = \frac{10}{\ln 5} - \frac{15.5\,x^{1/5}}{(\ln 5)^2}$

$\frac{dy}{dx} = \frac{10}{1.6094} - \frac{3.1}{2.5902}$

$\frac{dy}{dx} = 6.2133 - 1.1967$

$\frac{dy}{dx} = 5.01659$

$\frac{dy}{dx} \approx 5.02$ to 3 S.f

2) $y = 2x/(x^2-5)$ at point $(2, -4)$

$y = \frac{2x}{x^2-5}\;\frac{U}{V}$

$\frac{dy}{dx} = \frac{V\frac{du}{dx} - U\frac{dv}{dx}}{V^2}$

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

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

$$\frac{x^2 - 5(2) - 2x(2x)}{(x^2-5)^2}$$

$$\frac{dy}{dx} = \frac{2x^2 - 10 - 4x^2}{x^4 - 10x^2 + 25}$$

at $x = 2$

$$m = \frac{2(2)^2 - 10 - 4(2)^2}{(2)^4 - 10(2)^2 + 25}$$

$$= \frac{8 - 10 - 16}{16 - 40 + 25} = \frac{-81}{1}$$

$$= -18$$

at $x = -4$

$$m = \frac{2(-4)^2 - 10 - 4(-4)^2}{(-4)^4 - 10(-4)^2 + 25}$$

$$= \frac{32 - 10 - 64}{256 - 160 + 25} = \frac{-42}{121}$$

$$= -0.35$$

m_1 8 and -0.35

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

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

$$\frac{du}{dy} = 6x^2 \frac{dx}{dy} \qquad \frac{dx}{dy} = \frac{1}{y}$$

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

4) ~~$\int_0^2 \pi(2$~~

$$\int_0^2 3x(2x^2+1)^{1/2}\, dx$$

let $u = 2x^2 + 1$

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

$$du = dx\, 4x$$

$$dx = du/4x$$

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

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