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QUESTION

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Integration 19/6/2016/1029

THEORY QUESTIONS

Q14 104

1 $y = (2x+5)$

$\ln 2x$

$\ln 2x = 2x+5$ $v = \ln 2x$

$\frac{dv}{dx} = 4x$ $\frac{dv}{dx} = \frac{1}{x}$

$\frac{dy}{dx} = v \cdot \frac{dv}{dx} - \frac{1}{x} \cdot \frac{dv}{dx}$

$\frac{dy}{dx} = \frac{2x \ln 2x - \frac{1}{x} (2x+5)}{(2x)^2}$

$\frac{dy}{dx} \Big|_{x=2.5} = \frac{9(2.5) - \frac{1}{2.5} [2(2.5)+5]}{[2(2.5)]^2}$

$\frac{dy}{dx} \Big|_{x=2.5}$

$\frac{16.5 - 6.2}{2.5^2}$

$= \frac{3.8196}{2.5} \approx 3.82$

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

$v = 2x$

$v = x^2 - 5$

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

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

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

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

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$$\frac{dy}{dx} (2, -1) \\ = \frac{-2(2)^2 - 10}{[(2)^2 - 5]^2} = -\frac{18}{1} \\ \text{Gradient} = -18$$

$$3. \quad z = 2x^3ky \\ u = 2x^3 \quad v = ky \\ \frac{dz}{dy} = 6x^3 \quad \frac{dv}{dy} = k \\ \frac{dz}{dy} = 2x^3 \cdot k + ky \cdot 6x^3 \frac{dx}{dy} \\ \therefore \frac{dz}{dy} = \frac{2x^3}{y} + 6x^3ky \frac{dx}{dy}$$

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

$$\text{let } u = 2x^2 + 1$$

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

$$du = 4x dx$$

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

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

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

$$\frac{1}{4} \left[\frac{u^{3/2}}{3/2} \right]_0^2 = \frac{1}{6} \left[\frac{u^{3/2}}{1} \right]_0^2 \\ = \frac{1}{6} \left[(2x^2+1)^{3/2} - (2(0)+1)^{3/2} \right]$$

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$$= \frac{1}{6} [32-1]$$

$$= \frac{1}{6} (31)$$

$$= \underline{\underline{4.33}}$$