

(7)

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Note: Attempt all questions

(2)  
\* Attempt all question

Q NO # 3

part (a)

$$= \frac{3x^3 - 5x^2 + 5}{x^2 + 1}$$

$$= \frac{(x^2 + 1) \frac{d}{dx}(3x^3 - 5x^2 + 5) - (3x^3 - 5x^2 + 5) \frac{d}{dx}(x^2 + 1)}{(x^2 + 1)^2}$$

$$= \frac{(x^2 + 1) \cdot 9x^2 - 10x - (3x^3 - 5x^2 + 5) \cdot 2x}{x^4 + 2x^2 + 1}$$

$$= \frac{9x^4 + 9x^2 - 10x^3 - 10x - 6x^4 + 10x^3 - 10x}{x^4 + 2x^2 + 1}$$

$$= \frac{3x^4 + 9x^2 - 20x}{x^4 + 2x^2 + 1}$$

$$= \frac{3x^4 + 9x^2 - 20x}{(x^2 + 1)} \quad \text{Ans}$$

part (b)

$$= \frac{(x^2 + 1)^2}{x^2 - 1}$$

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

Applying Quotient rule

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

(3)

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

$$= \frac{4x^5 - 4x^3 + 4x^3 - 4x - [2x^5 + 4x^3 + 2x]}{(x^2-1)^2}$$

$$= \frac{4x^5 - 4x^3 + 4x^3 - 4x - [2x^5 + 4x^3 + 2x]}{(x^2-1)^2}$$

$$= \frac{4x^5 - 4x^3 + 4x^3 - 4x - 2x^5 - 4x^3 - 2x}{(x^2-1)^2}$$

$$= \frac{2x^5 - 4x^3 - 6x}{(x^2-1)^2} \quad \text{ANS}$$

Q NO # 2

part (a)

$$y = (1 + 2\sqrt{x})^3 \cdot x^{2/3}$$

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

$$= \frac{du}{dx} = \frac{d}{dx} (1 + 2(x)^{1/2})$$

$$\frac{du}{dx} = x^{-1/2}$$

$$y = (u)^3 \cdot x^{2/3}$$

using product rule

$$\frac{dy}{dx} = \frac{d}{dx} (u)^3 \cdot x^{2/3} + u^3 \cdot \frac{d}{dx} x^{2/3}$$

$$\frac{dy}{dx} = 3u^2 \cdot x^{2/3} + u^3 \cdot \frac{2}{3} x^{-1/3} \frac{dx}{dx}$$

$$\frac{dy}{dx} = 3u^2 \cdot x^{2/3} + u^3 \cdot \frac{2}{3} x^{-1/3}$$

$$\frac{dy}{dx} = 3u^2 \cdot x^{2/3} + u^3 \cdot x^{-1/3}$$

$$\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$$

$$\frac{dy}{dx} = (3u^2 \cdot x^{2/3} + u^3 \cdot x^{-1/3}) \times x^{-1/2}$$

Ans

part (b)

$$y = \sqrt{\frac{1-x}{1+x}}$$

$$\text{let } u = \frac{1-x}{1+x}$$

$$\frac{du}{dx} = \frac{d}{dx} \left[ \frac{1-x}{1+x} \right]$$

$$= \frac{(1+x) \frac{d}{dx}(1-x) - (1-x) \frac{d}{dx}(1+x)}{(1+x)^2}$$

$$= \frac{1+x(-1) - (1-x) \cdot 1}{(1+x)^2}$$

~~$$= \frac{-1-x-1+x}{(1+x)^2}$$~~

$$= \frac{-1 - \cancel{x} - 1 + \cancel{x}}{(1+x)^2} = \frac{-1}{(1+x)^2}$$

$$= \frac{dy}{du} = \frac{d}{du} \sqrt{u}$$

$$= \frac{dy}{du} = \frac{d}{du} (u)^{1/2}$$

$$= \frac{dy}{du} = \frac{1}{2}$$

Chain rule

$$= \frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$$

$$= \frac{1}{2} \times \frac{-1}{(1+x)^2}$$

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

Q NO 11 3

part (a)

$$= \int \frac{1}{\sqrt{x^3}} dx$$

$$= \int x^{-3/2} dx = \frac{x^{-3/2+1}}{-3/2+1} = \frac{x^{-1/2}}{-1/2}$$

$$\boxed{\frac{-2 + C}{\sqrt{x}}} \text{ Ans}$$

part (b)

$$= \int \frac{1}{(6x+7)^6} dx$$

$$= \int (6x+7)^{-6} dx$$

$$= \text{let } u = 6x+7$$

$$= \frac{du}{dx} = \frac{d}{dx} (6x+7)$$

$$= \int \frac{1}{6} (6x+7)^{-6} \frac{d}{dx} (6) dx$$

$$= \frac{1}{6} \frac{(6x+7)^{-6+1}}{-6+1} = \frac{1}{6} \frac{(6x+7)^{-5}}{-5}$$

$$= \cancel{A} - \frac{1}{30 \cdot (6x+7)}$$

Ans