

The Chain Rule Practice (Std 5b)

Find $f'(x)$

1) $(4x^2 + 1)^7$

$$\frac{d}{dx} (4x^2 + 1)^7 = 7(4x^2 + 1)^6 (8x)$$

$$= 56x(4x^2 + 1)^6$$

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

$$\frac{d}{dx} (3x^2 + 5x - 2)^{\frac{1}{2}} = \frac{1}{2} (3x^2 + 5x - 2)^{-\frac{1}{2}} (6x + 5)$$

$$= \frac{6x + 5}{2\sqrt{3x^2 + 5x - 2}}$$

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

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

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

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

$$\frac{d}{dx} (1-x)^{-3} = -3(1-x)^{-4} (-1)$$

$$= 3(1-x)^{-4}$$

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

$$5) \frac{x}{(\sqrt{x}-1)^3} \Rightarrow y' = \frac{1(\sqrt{x}-1)^3 - x(3)(\sqrt{x}-1)^2 \left(\frac{1}{2}x^{-\frac{1}{2}}\right)}{(\sqrt{x}-1)^6} = \frac{(\sqrt{x}-1)^3 - 3x^{\frac{1}{2}}x^{-\frac{1}{2}}(\sqrt{x}-1)^2}{(\sqrt{x}-1)^6}$$

$$y' = \frac{(\sqrt{x}-1)^3 - \frac{3}{2}x^{\frac{1}{2}}(\sqrt{x}-1)^2}{(\sqrt{x}-1)^6}$$