

## WARMUP

$$b^m \cdot b^n = b^{m+n}$$

$$\frac{b^m}{b^n} = b^{m-n}$$

$$1) \frac{d}{dx} (x^2(\sqrt{x}+3))$$

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

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

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

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

$$2) \text{ Find } y' \text{ if } y = \frac{3x^7 + 5x^3 - 2x}{x^2}$$

$$y = \frac{3x^7}{x^2} + \frac{5x^3}{x^2} - \frac{2x^1}{x^2}$$

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

$$y' = 15x^4 + 5 + 2x^{-2}$$

$$y' = 15x^4 + 5 + \frac{2}{x^2}$$

$$18) f(x) = 5x^4 + \frac{1}{x^2} = 5x^4 + x^{-2}$$

$$\frac{d}{dx}(x^n) = nx^{n-1}$$

$$f'(x) = 20x^3 - 2x^{-3}$$

$$= 20x^3 - \frac{2}{x^3}$$

$$24) y = \frac{x^2+1}{x} = \frac{x^2}{x} + \frac{1}{x} = x + x^{-1}$$

$$y' = 1 - x^{-2} = 1 - \frac{1}{x^2}$$

$$13) f(x) = x^e \quad e \text{ is a constant}$$

$$f'(x) = ex^{e-1}$$

pl III-112 21, 23, 24, 26, 27, 29, 30, 31, 35

$$14) y = 4x^{\frac{3}{2}} - 5x^{\frac{1}{2}}$$

$$y' = 6x^{\frac{1}{2}} - \frac{5}{2}x^{-\frac{1}{2}} = 6\sqrt{x} - \frac{5}{2\sqrt{x}}$$

$$26) f(t) = \frac{t^2}{t^4} + \frac{t^3}{t^4} - \frac{1}{t^4} = t^{-2} + t^{-1} - t^{-4}$$

$$f'(t) = -2t^{-3} - t^{-2} + 4t^{-5}$$

$$f'(t) = -\frac{2}{t^3} - \frac{1}{t^2} + \frac{4}{t^5}$$

$$27) y = \frac{\theta^{-1}}{\sqrt{\theta}} = \frac{\theta^{-1}}{\theta^{\frac{1}{2}}} = \theta^{-\frac{1}{2}} - \frac{1}{\theta^{\frac{1}{2}}} = \theta^{-\frac{1}{2}} - \theta^{-\frac{1}{2}} \quad \sqrt{\theta} - \frac{1}{\sqrt{\theta}}$$

$$y' = \frac{1}{2}\theta^{-\frac{3}{2}} + \frac{1}{2}\theta^{-\frac{3}{2}} = \frac{1}{2\theta^{\frac{3}{2}}} + \frac{1}{2\theta^{\frac{3}{2}}}$$
$$= \frac{1}{2\sqrt{\theta}} + \frac{1}{2\sqrt{\theta^3}}$$

$$29) V = \frac{4}{3}\pi r^2 b \quad \frac{dV}{dr}$$

$$V = \underbrace{\frac{4}{3}\pi b}_{c} \cdot \underbrace{r^2}_{f(x)}$$

$$\frac{dV}{dr} = \underbrace{\frac{4}{3}\pi b}_{c} \cdot \underbrace{2r}_{f'(x)} = \frac{8}{3}\pi br$$

$$cf(x)$$

vs.

$$c + f(x)$$

$$\frac{d}{dx} (cf(x))$$

$$= cf'(x)$$

$$\frac{d}{dx} (c + f(x))$$

$$= 0 + f'(x)$$

$$= f'(x)$$