

Opening Problem (Three ways to power through this problem!!!)

$$y = (x^2 + 4)(x^2 + 4)$$

$$y = x^4 + 4x^2 + 4x^2 + 16$$

$$y = x^4 + 8x^2 + 16$$

$$y' = 4x^3 + 16x$$

$$y = (x^2 + 4)(x^2 + 4)$$

$$y' = (x^2 + 4)(2x) + (x^2 + 4)(2x)$$

$$= (2x^3 + 8x) \cdot 2$$

$$= 4x^3 + 16x$$

$$y = (x^2 + 4)^2$$

$$\hookrightarrow u = x^2 + 4$$

$$y = u^2$$

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

$$= 2u \cdot 2x$$

$$= 2(x^2 + 4) \cdot 2x$$

$$= (2x^2 + 8)(2x)$$

$$= 4x^3 + 16x$$

More problems:

| | |
|---|--|
| $d. y = 4(7x + 4)^3$ $y' = 28(7x + 4)^2$ | $c. u = x^2 + 3$ $y = \sec(u)$ $\frac{dy}{dx} = 2x \cdot \sec(u) \tan(u)$ $\frac{dy}{dx} = 2x \sec(x^2 + 3) \tan(x^2 + 3)$ |
| $b. u = 5x - 2$ $y = \sqrt{u}$ $\frac{dy}{dx} = 5 \cdot \frac{1}{2} u^{-\frac{1}{2}}$ $\frac{dy}{dx} = \frac{5}{2} u^{-\frac{1}{2}}$ $\frac{dy}{dx} = \frac{5}{2\sqrt{5x-2}}$ | $d. u = x + \sqrt{x}$ $y = \sqrt{u}$ $\frac{dy}{dx} = \left(\frac{1}{2} u^{-\frac{1}{2}}\right) \cdot \left(1 + \frac{1}{2} x^{-\frac{1}{2}}\right)$ $\frac{dy}{dx} = \frac{1}{2\sqrt{u}} \cdot \left(1 + \frac{1}{2\sqrt{x}}\right)$ $\frac{dy}{dx} = \left(\frac{1}{2\sqrt{x+\sqrt{x}}}\right) \left(1 + \frac{1}{2\sqrt{x}}\right)$ |