

Board Problems 2.4 Chain Rule

$$\text{Ex. 4) } f(x) = \frac{1}{t^2 + 3t - 1}$$

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

$$5) f(x) = x(3x-9)^3$$

$$f'(x) = 27(x-3)^2(4x-3)$$

$$6) y = \frac{1}{2}x^2 \sqrt{16-x^2}$$

$$f'(x) = \frac{-x^3}{2\sqrt{16-x^2}} + x\sqrt{16-x^2}$$

or

$$\frac{-x(3x^2-32)}{2\sqrt{16-x^2}}$$

$$7) g(t) = \sqrt{\frac{1}{t^2-2}}$$

$$g'(t) = \frac{-t}{(t^2-2)^{3/2}}$$

$$8) y = 3(4-x^2)^5$$

$$y' = -30x(4-x^2)^4$$

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$$9) y(t) = \sqrt[3]{(9t+2)^2}$$

$$y'(t) = \frac{6}{\sqrt[3]{9t+2}}$$

$$10) h(t) = \left(\frac{t^2}{t^3+2} \right)^2$$

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

$$11) y = \frac{x}{\sqrt{x^4+4}}$$

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

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

$$\cdot \frac{\sqrt{x^4+4}}{\sqrt{x^4+4}}$$

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

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