

February 7, 2013 (Tuesday)

9.8 p 671

$$20. f(x) = \frac{1}{x}$$

$$f(x) = x^{-1}$$
$$f'(x) = -x^{-2}$$
$$f''(x) = 2x^{-3}$$
$$f'''(x) = -6x^{-4}$$
$$f^{(4)}(x) = 24x^{-5}$$

Instead of using the tick marks,
the derivative is in ().

$$f(x) = x^5$$
$$f'(x) = 5x^4$$
$$f''(x) = 20x^3$$
$$f'''(x) = 60x^2$$
$$f^{(4)}(x) = 120x$$
$$f^{(100)}(x) = 0$$

$$22. \frac{d^2 y}{dx^2} = \sqrt[3]{3x+2}, \text{ find } y^{(5)} \quad \frac{dy}{dx} = y' \quad \frac{d^2 y}{dx^2} = y''$$

$$y'' = (3x+2)^{1/3}$$
$$y''' = \frac{1}{3} (3x+2)^{-2/3} (3)$$
$$y^{(4)} = -\frac{2}{3} (3x+2)^{-5/3} (3)$$
$$y^{(4)} = -2 (3x+2)^{-5/3}$$
$$y^{(5)} = -2 \left(-\frac{5}{3}\right) (3x+2)^{-8/3} (3) = 10 (3x+2)^{-8/3} \text{ OR } \frac{10}{(3x+2)^{8/3}}$$

9.8
20. $f(x) = \frac{1}{x}$

2-7-2013

$$f(x) = x^{-1}$$

$$f'(x) = -1x^{-2}$$

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

$$f'''(x) = -6x^{-4}$$

$$f^{(4)}(x) = 24x^{-5}$$

More derivatives?
Of course!

almost 20. $f(x) = x^3$

$$f'(x) = 3x^2$$

$$f''(x) = 6x$$

Stop \rightarrow ~~*~~ $f'''(x) = 6$

here \rightarrow ~~*~~ $f^{(4)}(x) = 0$

$$f^{(100)}(x) = 0$$

$$\frac{dy}{dx} = y'$$

$$\frac{d^2y}{dx^2} = y''$$

$$\frac{d^3y}{dx^3} = y'''$$

22. $\frac{d^2y}{dx^2} = \sqrt[3]{3x+2}$, find $y^{(5)}$

$$y''(x) = (3x+2)^{1/3}$$

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

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

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

$$y^{(4)}(x) = -2(3x+2)^{-5/3}$$

$$y^{(5)}(x) = (-2)(-\frac{5}{3})(3x+2)^{-8/3} (3)$$

$$y^{(5)}(x) = 10(3x+2)^{-8/3}$$

or $\frac{10}{(3x+2)^{8/3}}$