

Student Name: _____

Score: _____

Answers:

$$\frac{dy}{dx} = 30x^2$$

$$\frac{dy}{dx} = \frac{-1}{x^2}$$

$$\frac{dy}{dx} = \frac{-1}{4} x^{\frac{-3}{2}}$$

$$\frac{dy}{dx} = -\frac{1}{5} x^{\frac{-16}{15}}$$

$$\frac{dy}{dx} = 48x^5 + 34x^{16}$$

$$\frac{dy}{dx} = \frac{1}{5} x^{\frac{-4}{5}}$$

$$\frac{dy}{dx} = \frac{1}{31} x^{\frac{-30}{31}} - \frac{1}{7} x^{\frac{-8}{7}}$$

$$\frac{dy}{dx} = 24x^{11} + 42x^6 + 4x^3$$

$$\frac{dy}{dx} = 5x^2 - 7x^5 + 12x^7$$

$$\frac{dy}{dx} = \frac{3}{4} x^{\frac{1}{2}} + \frac{55}{7} x^{\frac{-7}{2}} + \frac{3}{7} x^{\frac{-4}{7}}$$

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ANSWERS

Find the derivative.

$$1. y = 6x$$

$$y' = 6$$

$$2. f(x) = 5x^{1/2}$$

$$f'(x) = \frac{5}{2} x^{-1/2}$$

$$= \frac{5}{2\sqrt{x}}$$

$$3. g(x) = \sqrt[6]{x^5} = x^{5/6}$$

$$g'(x) = \frac{5}{6} x^{-1/6}$$

$$= \frac{5}{6x^{1/6}} = \frac{5}{6\sqrt[6]{x}}$$

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

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

$$= \frac{-1}{3x^{4/3}} = \frac{-1}{3\sqrt[3]{x^4}}$$

$$5. y = e^2$$

$$y' = 0$$

(e is a constant!)

$$6. y = \frac{1}{x^{2/3}} = x^{-2/3}$$

$$y' = -\frac{2}{3} x^{-5/3}$$

$$= \frac{-2}{3x^{5/3}} = \frac{-2}{3x^2\sqrt[3]{x}}$$

$$7. \frac{d}{dx}(8x^{-3}) = -24x^{-4}$$

$$= \frac{-24}{x^4}$$

$$8. f(x) = (\sqrt[5]{x})^2 = x^{2/5}$$

$$f' = \frac{2}{5} x^{-3/5}$$

$$= \frac{2}{5x^{3/5}}$$

$$= \frac{2}{5\sqrt[5]{x^3}}$$

$$9. h(x) = (3x+4)^2 = 9x^2 + 24x + 16$$

$$h'(x) = 18x + 24$$

$$10. g(x) = \sqrt{x(x^2+2x+3)} =$$

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

$$= x^{5/2} + 2x^{3/2} + 3x^{1/2}$$

$$g'(x) = \frac{5}{2}x^{3/2} + 2 \cdot \frac{3}{2}x^{1/2} + 3 \cdot \frac{1}{2}x^{-1/2}$$

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

$$11. \frac{d}{dx}(x^{0.35}) = 0.35x^{-0.65}$$

$$= \frac{0.35}{x^{0.65}}$$

$$12. y = 5x^3 - 4x^2 + 8x + 5 + x^{-3} + x^{-5}$$

$$y' = 15x^2 - 8x + 8 - 3x^{-4} - 5x^{-6}$$

$$= 15x^2 - 8x + 8 - \frac{3}{x^4} - \frac{5}{x^6}$$

13. If $f(x) = 3x^2 + 5$, find $f'(2)$

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

$$f'(2) = 6(2) = 12$$

14. Find the tangent line at $x = 1$ of $f(x) = x^5$

need pt: (1, 1) + m: ?

$$m = f'(x) = 5x^4$$

$$f'(1) = 5(1)^4 = 5$$

$$\text{so } m = 5$$

$$\boxed{y - 1 = 5(x - 1)}$$

15. Find the tangent line at the point (8, 64) of $f(x) = 24\sqrt[3]{x} + 2x$

need: pt (8, 64) + m: ?

$$m = f'(x) = 24 \cdot \frac{1}{3} x^{-2/3} + 2$$

$$= \frac{8}{\sqrt[3]{x^2}} + 2$$

$$m = f'(8) = \frac{8}{\sqrt[3]{8^2}} + 2 = \frac{8}{2} + 2 = 4$$

$$\boxed{y - 64 = 4(x - 8)}$$