

DERIVATIVE SHORTCUTS REVIEW

Directions: Apply the appropriate algebraic derivatives rule(s) (Power/Product/Quotient/Chain Rule) to find $f'(x)$ for each function.

1.) $f(x) = 2x^3 - 8x$

2.) $f(x) = \frac{1}{3x^2}$

3.) $f(x) = (2x + 3)(6 - x^3)$

4.) $f(x) = \sqrt[3]{x^5}$

5.) $f(x) = \frac{7x+6}{2x^4-5x}$

6.) $f(x) = \frac{2}{3\sqrt{x}}$

7.) $f(x) = \frac{1}{(4x+3)^3}$

8.) $f(x) = \frac{2}{\sqrt{x^2+3}}$

$$9.) f(x) = \sqrt[3]{(5x + 8)^4}$$

$$10.) f(x) = \frac{3}{(6x^2 - 9)^3}$$

$$11.) f(x) = \frac{4x}{(2x-3)^5}$$

$$12.) f(x) = \left(\frac{2}{7x+4}\right)^2$$

Directions: Find the slope of the tangent line for the following functions at the indicated x -value.

$$13.) f(x) = 3x^2 - 7 \text{ at } x = 2$$

$$14.) g(x) = (8x^2 + 7x + 1)^5 \text{ at } x = -1$$

Directions: Find the point(s) on the graph of the function where the slope of the tangent line is indicated.

$$15.) \text{ Where does } f(x) = \frac{x^3}{3} - 4x \text{ have } m = 0?$$

$$16.) \text{ Where does } g(x) = \frac{-2}{x^2} \text{ have } m = \frac{1}{2}$$

Directions: Find the derivative of the following function, then calculate the slope of the tangent at the given x value.

$$17.) f(x) = \frac{5}{x^4} + \frac{-7}{x^3} - \frac{3}{x^2} \quad x = -1$$

$$18.) f(x) = \frac{2x-4}{x-2} \quad x = 4$$

Directions: Find the derivative of the following function, then find the point(s) where the slope of the tangent line is 16.

$$19.) g(x) = 24\sqrt[3]{x^2}$$

Directions: Find the derivative of the following function.

$$20.) h(x) = \frac{3}{4x^2-7x}$$

$$21.) j(x) = \frac{5}{(x^2+8)^4}$$

$$22.) k(x) = \frac{2}{5\sqrt{x^5}}$$

$$23.) y = (3x^2 + 2x)(x^4 - 3x + 1)$$

Directions: Find the derivative of the following function using two different methods.

$$24.) y = (x^3 + 4)(2x^2 - x)$$

Directions: Find the derivative of $g(x)$. Then find the values of x where the slope of the tangent line is 12.

25.) $g(x) = (4x + 2)^3$

Directions: Find the derivative of the following function.

26.) $f(x) = \frac{2x}{(6x-1)^4}$

SOLUTIONS

1.) $f'(x) = 6x^2 - 8$

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

3.) $f'(x) = -8x^3 - 9x^2 + 12$

4.) $f'(x) = \frac{5\sqrt[3]{x^2}}{3}$

5.) $f'(x) = \frac{-42x^4 - 48x^3 + 30}{(2x^4 - 5x)^2}$

6.) $f'(x) = \frac{-1}{3\sqrt{x^3}}$

7.) $f'(x) = -\frac{12}{(4x+3)^4}$

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

9.) $f'(x) = \frac{20\sqrt[3]{5x+8}}{3}$

10.) $f'(x) = -\frac{108x}{(6x^2-9)^4}$

11.) $f'(x) = \frac{4(-8x-3)}{(2x-3)^6}$

12.) $f'(x) = -\frac{56}{(7x+4)^3}$

13.) $m = 12$

14.) $m = -720$

15.) $\left(2, -\frac{16}{3}\right) \& \left(-2, \frac{16}{3}\right)$

16.) $\left(2, -\frac{1}{2}\right)$

17.) $f'(x) = -\frac{20}{x^5} + \frac{21}{x^4} + \frac{6}{x^3}$

18.) $f'(x) = 0 \quad m = 0$

19.) $g'(x) = \frac{16}{\sqrt[3]{x}}$

20.) $h'(x) = \frac{-24x+21}{(4x^2-7x)^2}$

21.) $j'(x) = -\frac{40x}{(x^2+8)^5}$

22.) $k'(x) = -\frac{1}{\sqrt{x^7}}$

23.) $y' = 18x^5 + 10x^4 - 27x^2 - 6x + 2$

24.) $y' = 10x^4 - 4x^3 + 16x - 4$

25.) $g'(x) = 12(4x + 2)^2 \quad x = -\frac{1}{4}, -\frac{3}{4}$

26.) $f'(x) = \frac{-36x-2}{(6x-1)^5}$