General Power Differentiation Rule … Set 2

Derivative Power Rule

Derivative Power Rule:

$$\frac{d}{dx}x^n = n * x^{n-1}$$

Power Rule Conditions:

i) All Radicals converted to Rational Exponents
ii) All denominator variables brought up to the numerator
iii) All parentheses resolved, all terms expanded

Finding a Derivative **use the rules of differentiation to find the derivative of the function.**

1) $y = x^7$

2) $y = \frac{1}{x^5}$

3) $y = \frac{3}{x^7}$

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

5) $f(t) = -2t^2 + 3t - 6$

6) $y = \frac{5}{2x^2}$

7) $y = \frac{3}{2x^4}$

8) $y = \frac{6}{(5x)^3}$

General Power Differentiation Rule … Set 2

Answers

Finding a Derivative use the rules of differentiation to find the derivative of the function.

1) $y = x^7$

$y' = 7x^6$

2) $y = \frac{1}{x^5}$

$y = x^{-5}$

$y' = -5x^{-6}$

$y' = \frac{-5}{x^6}$

3) $y = \frac{3}{x^7}$

$y = 3x^{-7}$

$y' = 3 \cdot -7x^{-8}$

$y' = \frac{-21}{x^8}$

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

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

$f'(x) = \frac{1}{5}x^{-4/5}$

$f'(x) = \frac{1}{5x^{4/5}}$

5) $f(t) = -2t^2 + 3t - 6$

$f'(t) = -4t + 3$

6) $y = \frac{5}{2x^2}$

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

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

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

7) $y = \frac{3}{2x^4}$

$y = \frac{3}{2}x^{-4}$

$y' = \frac{3}{2} \cdot -4x^{-5}$

$y' = \frac{-12}{2}x^{-5}$

$y' = \frac{-6}{x^5}$

8) $y = \frac{6}{(5x)^3}$

$y = \frac{6}{5^3x^3}$

$y = \frac{6}{125}x^{-3}$

$y' = \frac{6}{125} \cdot -3x^{-4}$

$y' = \frac{-18}{125}x^{-4}$

$y' = \frac{-18}{125x^4}$

General Power Differentiation Rule … Set 2

Derivative Power Rule:

$\frac{d}{dx}x^n = n * x^{n-1}$

Power Rule Conditions:

i) All Radicals converted to Rational Exponents
ii) All denominator variables brought up to the numerator
iii) All parentheses resolved, all terms expanded

Find the derivative of the functions below:

9) $g(t) = t^2 - \frac{4}{t^3}$

10) $f(x) = \frac{4x^3 + 3x^2}{x}$

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

12) $y = x^2(2x^2 - 3x)$

13) $f(x) = \sqrt{x} - 6\sqrt[3]{x}$

14) $f(t) = t^{2/3} - t^{1/3} + 4$

Equation of tangent line:

i) Find ordered pair $((x_1, y_1)$ using $f(x)$
ii) Find slope m using $f'(x)$
iii) $y - y_1 = m(x - x_1)$

Finding an Equation of a Tangent Line In Exercises (a) find an equation of the tangent line to the graph of f at the given point.

15) $y = x^4 - 3x^2 + 2$ $(1, 0)$

16) $y = x^3 - 3x$ $(2, 2)$

General Power Differentiation Rule … Set 2

Answers

Find the derivative of the functions below:

10) $g(t) = t^2 - \frac{4}{t^3}$

$g(t) = t^2 - 4t^{-3}$

$g'(t) = 2t - 4(-3t^{-4})$

$g'(t) = 2t + \frac{12}{t^4}$

11) $f(x) = \frac{4x^3 + 3x^2}{x}$

$f(x) = (4x^3 + 3x^2)x^{-1}$

$f(x) = 4x^2 + 3x$

$f'(x) = 8x + 3$

12) $f(x) = \frac{2x^4 - x}{x^3}$

$f(x) = (2x^4 - x)x^{-3}$

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

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

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

13) $y = x^2(2x^2 - 3x)$

$y = 2x^4 - 3x^3$

$y' = 8x^3 - 9x^2$

14) $f(x) = \sqrt{x} - 6\sqrt[3]{x}$

$f(x) = x^{1/2} - 6x^{1/3}$

$f'(x) = \frac{1}{2}x^{-1/2} - 6 \cdot \frac{1}{3}x^{-2/3}$

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

15) $f(t) = t^{2/3} - t^{1/3} + 4$

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

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

Finding an Equation of a Tangent Line In Exercises (a) find an equation of the tangent line to the graph of f at the given point.

Equation of tangent line:

i) Find ordered pair $((x_1, y_1)$ using $f(x)$

ii) Find slope m using $f'(x)$

iii) $y - y_1 = m(x - x_1)$

16) $y = x^4 - 3x^2 + 2$ $(1, 0)$

$y' = 4x^3 - 6x$

$y'(1) = 4(1)^3 - 6(1) = -2$

point: $(1, 0)$

slope: $m = -2$

$y - 0 = -2(x - 1)$

$y = -2(x - 1)$

17) $y = x^3 - 3x$ $(2, 2)$

$y' = 3x^2 - 3$

$y'(2) = 3(2)^2 - 3 = 9$

point: $(2, 2)$

slope: $m = 9$

$y - 2 = 9(x - 2)$