

# Simple Derivatives

Find the derivative of each of the following:

1)  $y = 7x^2$

2)  $y = -5x^{12}$

3)  $y = 4x^{-2}$

4)  $y = x^{-1}$

5)  $y = \sqrt{x}$

6)  $y = \sqrt[4]{x}$

7)  $y = \sqrt{x^5}$

8)  $y = \frac{15}{x^3}$

9)  $y = \frac{9}{\sqrt{x}}$

10)  $y = \sqrt[5]{x^3}$

# Derivatives

Find the derivative of each of the following:

1)  $y = x^3 + x^2 + 1$

2)  $y = 6x^3 - 4x^2 + 2x$

3)  $y = 9x^{10} + 10x^9$

4)  $y = 4x^4 + 6x^2 + 8 + \frac{2}{x}$

5)  $y = \sqrt{x} - \frac{1}{\sqrt{x}}$

6)  $y = \frac{3}{x} + \frac{3}{x^2} - \frac{3}{x^3}$

7)  $y = x^2 + 4x + 10 - \frac{2}{x} - \frac{6}{x^2}$

8)  $y = 3\sqrt[5]{x} + 15\sqrt{x} + \frac{3}{\sqrt[5]{x}} + \frac{15}{\sqrt{x}}$

9)  $y = \frac{x^{n+1}}{n+1} + \frac{x^n}{n} + \frac{x^{n-1}}{n-1}$

10)  $y = x^{n+1} + x^n + x^{n-1}$

## Product Rule

Find the derivative of each of the following:

1)  $y = (x^2 + 2x + 1)(x^2 + 3x + 2)$

2)  $y = (5x^2 + x)(3x^3 + 8x + 7)$

3)  $y = (4x^3 - 3x - 2)(6x^2 + 7)$

4)  $y = x^2 e^x$

5)  $y = x^2 \sin x$

6)  $y = e^x \cos x$

7)  $y = \sqrt{x} \tan x$

8)  $y = \sec x \tan x$

9)  $y = e^x \csc x$

10)  $y = \cot x \tan x$

## Quotient Rule

Find the derivative of each of the following:

$$1) \quad y = \frac{5x+1}{2-x}$$

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

$$3) \quad y = \frac{6x^2 - 4}{3x^2 + 4x - 8}$$

$$4) \quad y = \frac{x^2}{e^x}$$

$$5) \quad y = \frac{\sin x}{e^x}$$

$$6) \quad y = \frac{x + \frac{1}{x}}{x^2 - \frac{1}{x^2}}$$

$$7) \quad y = \frac{\sqrt{x} + \tan x}{\sqrt{x} - \cot x}$$

$$8) \quad y = \frac{\sec x}{\csc x}$$

$$9) \quad y = \frac{e^x + 1}{e^x - 1}$$

$$10) \quad y = \frac{\tan x}{\cot x}$$

## Chain Rule

Find the derivative of each of the following:

$$1) \quad y = (x^2 + 4x + 1)^3$$

$$2) \quad y = (8x^3 + 7)^6$$

$$3) \quad y = (10x^8 + 6x + 1)^4$$

$$4) \quad y = \sqrt{9 - 3x}$$

$$5) \quad y = e^{\frac{x}{4}}$$

$$6) \quad y = (\sin x + \cos x)^{\frac{2}{3}}$$

$$7) \quad y = e^{x^2} \sin 2x$$

$$8) \quad y = \sec^4 \pi x$$

$$9) \quad y = \tan^2(\sin x)$$

$$10) \quad y = (\sin 2x + \cos 2x)^2$$