

Mathematics Tutorial Series

Differential Calculus #11

Examples

Find the derivative of each.

$$1. y = \frac{x^2+1}{x-7}$$

$$2. y = \frac{\sin x}{x^2}$$

$$3. y = \cos x \sin^2 x$$

$$4. y = \sqrt{\sin x + \tan x}$$

$$5. y = \cos(5x^2 + 7)$$

$$6. y = 2 \sin x + \tan^2 x$$

$$7. y = x \sin x$$

$$8. y = \cos(x\sqrt{x^2 + 3})$$

$$y = \frac{x^2 + 1}{x - 7}$$

$$\begin{aligned} \rightarrow y' &= \frac{(x^2+1)'(x-7) - (x^2+1)(x-7)'}{(x-7)^2} \\ &= \frac{2x(x-7) - (x^2+1)}{(x-7)^2} \end{aligned}$$

$$y = \frac{\sin x}{x^2}$$

$$\rightarrow y' = \frac{\cos x x^2 - \sin x (2x)}{x^4}$$

$$y = \cos x \sin^2 x$$

$$\begin{aligned} \rightarrow y' &= (\cos x)' \sin^2 x + \cos x (\sin^2 x)' \\ &= (-\sin x) \sin^2 x + \cos x (2 \sin x \cos x) \\ &= -\sin^3 x + 2 \sin x \cos^2 x \end{aligned}$$

$$y = \sqrt{\sin x + \tan x}$$

$$\begin{aligned}\rightarrow y' &= \frac{1}{2\sqrt{\sin x + \tan x}} (\sin x + \tan x)' \\ &= \frac{\cos x + \sec^2 x}{2\sqrt{\sin x + \tan x}}\end{aligned}$$

$$y = \cos(5x^2 + 7)$$

$$\begin{aligned}\rightarrow y' &= -\sin(5x^2 + 7) (5x^2 + 7)' \\ &= -\sin(5x^2 + 7)(10x)\end{aligned}$$

$$y = 2 \sin x + \tan^2 x$$

$$\rightarrow y' = 2 \cos x + 2 \tan x \sec^2 x$$

$$y = x \sin x$$

$$\rightarrow y' = \sin x + x \cos x$$

$$y = \cos(x\sqrt{x^2 + 3})$$

$$\begin{aligned}\rightarrow y' &= -\sin(x\sqrt{x^2 + 3}) (x\sqrt{x^2 + 3})' \\ &= -\sin(x\sqrt{x^2 + 3}) (\sqrt{x^2 + 3} + x \frac{1}{2\sqrt{x^2 + 3}} (x^2 + 3)') \\ &= -\sin(x\sqrt{x^2 + 3}) (\sqrt{x^2 + 3} + x \frac{2x}{2\sqrt{x^2 + 3}}) \\ &= -\sin(x\sqrt{x^2 + 3}) \frac{2x^2 + 3}{\sqrt{x^2 + 3}}\end{aligned}$$

Hints:

Copy the question correctly

Stay focused until the end

Pull all the parts together

Read it all over before you move on