✔ 3.6.1

Given $y = f(u)$ and $u = g(x)$, find $\dfrac{dy}{dx} = f'(g(x))\, g'(x)$.

$$y = 8u - 9, \quad u = \left(\frac{1}{4}\right) x^7$$

$$\dfrac{dy}{dx} = \boxed{14x^6}$$

✔ 3.6.3

Given $y = f(u)$ and $u = g(x)$, find $\dfrac{dy}{dx} = f'(g(x))g'(x)$ for the following functions.

$$y = \sin u, \; u = 2x - 3$$

$$\dfrac{dy}{dx} = f'(g(x))g'(x) = \boxed{2\cos(2x-3)}$$

✔ 3.6.9

Write the function below in the form $y = f(u)$ and $u = g(x)$, then find $\dfrac{dy}{dx}$ as a function of x.

$$y = (6x + 19)^7$$

Write $y = (6x + 19)^7$ in the form $y = f(u)$ and $u = g(x)$. Choose the correct functions f(u) and g(x) below.

- ○ A. $f(u) = 6u^7$
       $g(x) = x + 19$

- ✔ B. $f(u) = u^7$
       $g(x) = 6x + 19$

- ○ C. $f(u) = (u + 19)^7$
       $g(x) = 6x$

- ○ D. $f(u) = 6u + 19$
       $g(x) = x^7$

$$\dfrac{dy}{dx} = \boxed{42(6x + 19)^6}$$

✔ 3.6.11

Write the function in the form $y = f(u)$ and $u = g(x)$. Then find $\dfrac{dy}{dx}$ as a function of x.

$$y = \left(1 - \frac{6x}{5}\right)^{-5}$$

$$u = \left(1 - \frac{6x}{5}\right)$$

(Type an expression using x as the variable.)

$$y = u^{-5}$$

(Type an expression using u as the variable.)

$$\frac{dy}{dx} = 6\left(1 - \frac{6x}{5}\right)^{-6}$$

(Type an expression using x as the variable.)

✔ 3.6.17

Write the function in the form $y = f(u)$ and $u = g(x)$. Then find $\dfrac{dy}{dx}$ as a function of x.

$$y = \csc^6 x$$

$$u = \csc x$$

(Type an expression using x as the variable.)

$$y = u^6$$

(Type an expression using u as the variable.)

$$\frac{dy}{dx} = -6\csc^5 x \csc x \cot x$$

(Type an expression using x as the variable.)

✗ 3.6.19

Find the derivative of the function $y = \sqrt{5 - 3x}$.

$$\frac{dy}{dx} = -\frac{3}{2\sqrt{5 - 3x}}$$

You answered: $\dfrac{3}{2\sqrt{5 - 3x}}$

Get answer feedback

I just forgot to add the negative. It should've been negative.

✓ 3.6.25

Find the derivative of the given function.

$$y = x^2 \sin^5 x + x \cos^{-3} x$$

$$\frac{dy}{dx} = 5x^2 \sin^4 x \cos x + 2x \sin^5 x + 3x \cos^{-4} x \sin x + \cos^{-3} x$$

✓ 3.6.31

Find the derivative of the function below.

$$h(x) = x \cot\left(8\sqrt{x}\right) + 3$$

$$\frac{dh}{dx} = -4\sqrt{x} \csc^2\left(8\sqrt{x}\right) + \cot\left(8\sqrt{x}\right)$$

✔ 3.6.37

Find the derivative of the function below.

$$r = \sin\left(\theta^8\right)\cos(4\theta)$$

$$\frac{dr}{d\theta} = 8\theta^7\cos(4\theta)\cos\left(\theta^8\right) - 4\sin\left(\theta^8\right)\sin(4\theta)$$

✘ 3.6.43

Find $\frac{dy}{dt}$.

$$y = (2 + \cos 4t)^{-6}$$

$$\frac{dy}{dt} = \frac{24\sin 4t}{(2 + \cos 4t)^7}$$

You answered: $\dfrac{24\sin 4t}{(2 + \cos 4t)^{-6}}$

Get answer feedback

This is incorrect in mathlabs. My answer is right.

✘ 3.6.59

Find y'' for $y = \left(5 + \dfrac{1}{x}\right)^3$.

$$y'' = \frac{6}{x^3}\left(5 + \frac{1}{x}\right)\left(5 + \frac{2}{x}\right)$$

You answered: $\dfrac{-3(5x + 1)^2}{x^4}$

Get answer feedback

I only found the 1st derivative to this equation, I was supposed to find it to the second derivative

✔ 3.6.61

Find y''.

$$y = \frac{1}{36} \tan(6x - 1)$$

$$y'' = 2\sec^2(6x - 1)\tan(6x - 1)$$

✔ 3.6.65

Find the value of (f ∘ g)' at the given value.

$$f(u) = u^7 + 8, \quad u = g(x) = \sqrt{x}, \quad x = 1$$

$$(f \circ g)'(1) = \frac{7}{2}$$

(Type an integer or a simplified fraction.)

✔ 3.6.69

Find the value of (f ∘ g)' at the given value of x.

$$f(u) = \frac{2u}{u^2 + 5}, \quad u = g(x) = 3x^2 + 5x + 1, \quad x = 0$$

$$(f \circ g)'(0) = \frac{10}{9}$$

(Type an integer or a simplified fraction.)

✔ 3.7.1

Use implicit differentiation to find $\frac{dy}{dx}$.

$$9x^2y + 2xy^2 = 1$$

$$\frac{dy}{dx} = \frac{-18xy - 2y^2}{4xy + 9x^2}$$

✔ 3.7.2

Use implicit differentiation to find $\dfrac{dy}{dx}$ using the following equation.

$$x^5 + y^5 = 25xy$$

Choose the correct answer below.

○ A. $\dfrac{dy}{dx} = \dfrac{x^4 - 5y}{y^4 - 5x}$

○ B. $\dfrac{dy}{dx} = \dfrac{y^4 - 5x}{5y + x^4}$

✔ C. $\dfrac{dy}{dx} = \dfrac{5y - x^4}{y^4 - 5x}$

○ D. $\dfrac{dy}{dx} = \dfrac{5x - y^4}{x^4 - 5y}$

✔ 3.7.3

Use implicit differentiation to find dy / dx.

$$5xy + y^2 = 6x + y$$

$$\dfrac{dy}{dx} = \dfrac{6 - 5y}{5x + 2y - 1}$$

✔ 3.7.7

Use implicit differentiation to find $\dfrac{dy}{dx}$.

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

$$\dfrac{dy}{dx} = \dfrac{3}{2y(3x + 2)^2}$$

✔ 3.7.9

Use implicit differentiation to find $\dfrac{dy}{dx}$.

$x = \cos y$

$\dfrac{dy}{dx} = \boxed{- \csc y}$

✔ 3.7.17

Use implicit differentiation to find $\dfrac{dr}{d\theta}$ using the following equation.

$\sin (r\theta) = \dfrac{1}{5}$

$\dfrac{dr}{d\theta} = \boxed{- \dfrac{r}{\theta}}$

✔ 3.7.19

Use implicit differentiation to find $\dfrac{dy}{dx}$ and $\dfrac{d^2y}{dx^2}$ using the following equation.

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

Choose the correct answer below.

✔ A. $\dfrac{dy}{dx} = -\dfrac{x}{2y}$ B. $\dfrac{dy}{dx} = \dfrac{2x}{y}$

C. $\dfrac{dy}{dx} = -\dfrac{y}{2x}$ D. $\dfrac{dy}{dx} = \dfrac{2y}{x}$

Choose the correct answer below.

A. $\dfrac{d^2y}{dx^2} = -\dfrac{4y^3}{2x^2 + y^2}$ B. $\dfrac{d^2y}{dx^2} = -\dfrac{4y^3}{2y^2 + x^2}$

✔ C. $\dfrac{d^2y}{dx^2} = -\dfrac{2y^2 + x^2}{4y^3}$ D. $\dfrac{d^2y}{dx^2} = -\dfrac{2x^2 + y^2}{4y^3}$

✔ 3.7.25

If $x^3 + y^3 = 7$, find the value of $\dfrac{d^2y}{dx^2}$ at the point $(-1,2)$.

The value of $\dfrac{d^2y}{dx^2}$ at the point $(-1,2)$ is $\dfrac{7}{16}$.

(Type a simplified fraction.)

✔ 3.7.27

Find the slope of the curve at the given point.

$3y^3 + 7x^7 = 8y + 2x$ at $(1,1)$

The slope of the curve $3y^3 + 7x^7 = 8y + 2x$ at $(1,1)$ is -47.
(Type a simplified fraction.)

✔ 3.8.1

Question

Suppose that a dimension x and the area $A = 11x^2$ of a shape are differentiable functions of t. Write an equation that relates $\dfrac{dA}{dt}$ to $\dfrac{dx}{dt}$.

$\dfrac{dA}{dt} = \left(22x \right) \dfrac{dx}{dt}$

✔ 3.8.5

Assume that $x = x(t)$ and $y = y(t)$. Let $y = x^2 + 5$ and $\dfrac{dx}{dt} = 2$ when $x = 1$.

Find $\dfrac{dy}{dt}$ when $x = 1$.

$\dfrac{dy}{dt} = 4$ (Simplify your answer.)

✗ 3.8.7

Assume that all variables are implicit functions of time t. Find the indicated rate.

$$x^2 + 5y^2 + 4y = 17;\ \frac{dx}{dt} = 3 \text{ when } x = 4 \text{ and } y = -1;\ \text{find } \frac{dy}{dt}$$

$\frac{dy}{dt} = 4$ (Simplify your answer.)

You answered: 12

[Get answer feedback]

Not sure what I did wrong,

✓ 3.8.11

The original 24 m edge length x of a cube decreases at the rate of 3 m/min.

a. When x = 4 m, at what rate does the cube's surface area change?
b. When x = 4 m, at what rate does the cube's volume change?

a. When x = 4 m, the surface area is changing at a rate of -144 m²/min.
(Type an integer or a decimal.)

b. When x = 4 m, the volume is changing at a rate of -144 m³/min.
(Type an integer or a decimal.)

✔ 3.8.13

The dimensions x and y of an object are related to its volume V by the formula $V = 4x^2y$.

a. How is $\dfrac{dV}{dt}$ related to $\dfrac{dy}{dt}$ if x is constant?

b. How is $\dfrac{dV}{dt}$ related to $\dfrac{dx}{dt}$ if y is constant?

c. How is $\dfrac{dV}{dt}$ related to $\dfrac{dx}{dt}$ and $\dfrac{dy}{dt}$ if neither x nor y is constant?

---

a. Complete the equation for when x is constant.

$$\frac{dV}{dt} = \left(4x^2 \right) \frac{dy}{dt}$$

b. Complete the equation for when y is constant.

$$\frac{dV}{dt} = \left(8xy \right) \frac{dx}{dt}$$

c. Complete the equation for when neither x nor y is constant.

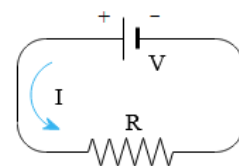$$\frac{dV}{dt} = \left(8xy \right) \frac{dx}{dt} + \left(4x^2 \right) \frac{dy}{dt}$$

✔ 3.8.15

≡ Question Help ⚙

The voltage V (volts), current I (amperes), and resistance R (ohms) of an electric circuit like the one shown here are related by the equation $V = IR$. Suppose that V is increasing at the rate of 4 volt/sec while I is decreasing at the rate of $\dfrac{1}{5}$ amp/sec. Let t denote time in seconds. Answer the following questions.

a. What is the value of $\dfrac{dV}{dt}$?

$\dfrac{dV}{dt} = 4$ volt/sec (Simplify your answer.)

b. What is the value of $\dfrac{dI}{dt}$?

$\dfrac{dI}{dt} = \boxed{-\dfrac{1}{5}}$ amp/sec (Simplify your answer.)

c. What equation relates $\dfrac{dR}{dt}$ to $\dfrac{dV}{dt}$ and $\dfrac{dI}{dt}$? Choose the correct answer below.

A. $\dfrac{dR}{dt} = \dfrac{1}{I}\dfrac{dV}{dt}$

B. $\dfrac{dR}{dt} = \dfrac{1}{I}\left(\dfrac{dV}{dt} - \dfrac{V}{I}\dfrac{dI}{dt}\right)$ ✓

C. $\dfrac{dR}{dt} = I\dfrac{dI}{dt} + V\dfrac{dV}{dT}$

D. $\dfrac{dR}{dt} = \dfrac{1}{I}\dfrac{dV}{dt} + V\dfrac{dI}{dt}$

d. Find the rate at which R is changing when V = 20 volts and I = 2 amp. Is R increasing or decreasing?

R is changing at 3 ohm/sec. (Simplify your answer.)

Is R increasing or decreasing?

○ Decreasing

✔ Increasing

✔ 3.8.20   ☰ Question Help   ⚙

When a circular plate of metal is heated in an oven, its radius increases at a rate of 0.02 cm / min. At what rate is the plate's area increasing when the radius is 48 cm?
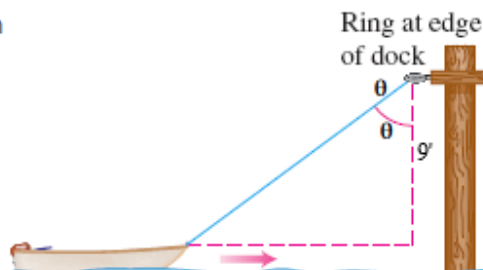
The rate of change of the area is 1.92π cm^2 / min.
(Type an exact answer in terms of π.)

✔ 3.8.32

A dinghy is pulled toward a dock by a rope from the bow through a ring on the dock 9 feet above the bow. The rope is hauled in at the rate of 3 ft/sec. Complete parts **a.** and **b.**

Ring at edge of dock

a. How fast is the boat approaching the dock when 15 ft of rope are out?

The distance between the boat and the dock is changing at a rate of $-\dfrac{15}{4}$ ft/sec.

(Type an integer or a simplified fraction.)

b. At what rate is the angle θ changing at this instant? $-\dfrac{3}{20}$ rad/sec.

(Type an integer or a simplified fraction.)

✓ 3.9.1

Find the linearization L(x) at $x = a$.

$f(x) = -3x^3 - 4x + 1 \qquad a = 1$

$L(x) = \boxed{-13x + 7}$

✓ 3.9.9

Find a linearization at a suitably chosen integer near a at which the given function and its derivative are easy to evaluate.

$f(x) = 3x^2 + 4x - 3, \ a = -0.9$

Set the center of the linearization as $x = \boxed{-1}$.

$L(x) = \boxed{-2x - 6}$

✓ 3.9.17

Find dy for $y = 8x^6 + 3\sqrt{3x}$.

$dy = \boxed{\left(48x^5 + \dfrac{9}{2\sqrt{3x}}\right)} dx$

✓ 3.9.23

Find dy.

$y = \cos\left(7\sqrt{x}\right)$

$dy = \boxed{-\dfrac{7\sin 7\sqrt{x}}{2\sqrt{x}}} dx$