✔ 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.

$$y = (5x + 16)^9$$

Write $y = (5x + 16)^9$ in the form $y = f(u)$ and $u = g(x)$. Choose the correct functions f(u) and g(x) below.

○ A. $f(u) = 5u + 16$
       $g(x) = x^9$

○ B. $f(u) = (u + 16)^9$
       $g(x) = 5x$

✔ C. $f(u) = u^9$
       $g(x) = 5x + 16$

○ D. $f(u) = 5u^9$
       $g(x) = x + 16$

$$\dfrac{dy}{dx} = 45(5x + 16)^8$$

✔ 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.

$$y = \sin^5 x$$

$u = \sin x$
(Type an expression using x as the variable.)

$y = u^5$
(Type an expression using u as the variable.)

$\dfrac{dy}{dx} = 5 \sin^4 x \cos x$
(Type an expression using x as the variable.)

✅ 3.6.19

Find the derivative of the function $y = \sqrt{6 - 7x}$.

$$\frac{dy}{dx} = -\frac{7}{2\sqrt{6-7x}}$$

✅ 3.6.37

Find the derivative of the function below.

$$r = \sin\left(\theta^2\right) \cos(6\theta)$$

$$\frac{dr}{d\theta} = 20\cos(6\theta)\cos\left(\theta^2\right) - 6\sin\left(\theta^2\right)\sin(6\theta)$$

✅ 3.6.59

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

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

✔ 3.6.61

Find y''.

$$y = \frac{1}{9}\cot(3x+4)$$

$$y'' = \boxed{2\csc^2(3x+4)\cot(3x+4)}$$

✔ 3.7.2

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

$$x^5 + y^5 = 30xy$$

Choose the correct answer below.

○ A. $\dfrac{dy}{dx} = \dfrac{6x - y^4}{x^4 - 6y}$

☑ B. $\dfrac{dy}{dx} = \dfrac{6y - x^4}{y^4 - 6x}$

○ C. $\dfrac{dy}{dx} = \dfrac{y^4 - 6x}{6y + x^4}$

○ D. $\dfrac{dy}{dx} = \dfrac{x^4 - 6y}{y^4 - 6x}$

✔ 3.7.3

Use implicit differentiation to find dy / dx.

$$2xy + y^2 = 3x + y$$

$$\frac{dy}{dx} = \boxed{\frac{3 - 2y}{2x + 2y - 1}}$$

✔ 3.7.17

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

$$\cot\left(r\theta^4\right) = \frac{1}{6}$$

$$\frac{dr}{d\theta} = \boxed{-\frac{4r}{\theta}}$$

✔ 3.7.25

If $x^3 + y^3 = 16$, find the value of $\dfrac{d^2y}{dx^2}$ at the point (2,2).

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

(Type a simplified fraction.)

✔ 3.8.5

Assume that $x = x(t)$ and $y = y(t)$. Let $y = x^2 + 2$ and $\dfrac{dx}{dt} = 4$ when $x = 1$.

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

$\dfrac{dy}{dt} = \boxed{8}$ (Simplify your answer.)

✔ 3.8.7

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

$x^2 + 4y^2 + 6y = 47$; $\dfrac{dx}{dt} = 1$ when $x = 7$ and $y = -1$; find $\dfrac{dy}{dt}$

$\dfrac{dy}{dt} = \boxed{7}$ (Simplify your answer.)

✔ 3.8.11

The original 24 m edge length x of a cube decreases at the rate of 5 m/min.

a. When $x = 3$ m, at what rate does the cube's surface area change?
b. When $x = 3$ m, at what rate does the cube's volume change?

a. When $x = 3$ m, the surface area is changing at a rate of $\boxed{-180}$ m^2/min.
 (Type an integer or a decimal.)

b. When $x = 3$ m, the volume is changing at a rate of $\boxed{-135}$ m^3/min.
 (Type an integer or a decimal.)

✓ **3.8.20**   ☰ Question Help

When a circular plate of metal is heated in an oven, its radius increases at a rate of 0.03 cm / min. At what rate is the plate's area increasing when the radius is 45 cm?
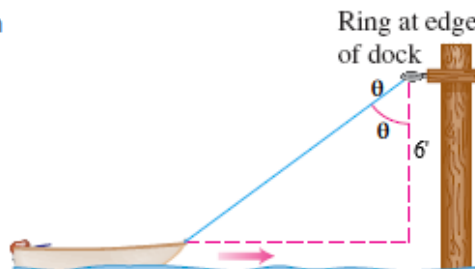
The rate of change of the area is 2.7π cm^2 / min.
(Type an exact answer in terms of π.)

✓ **3.8.32**

A dinghy is pulled toward a dock by a rope from the bow through a ring on the dock 6 feet above the bow. The rope is hauled in at the rate of 2 ft/sec. Complete parts **a.** and **b.**

Ring at edge of dock

θ

θ

6′

a. How fast is the boat approaching the dock when 10 ft of rope are out?

The distance between the boat and the dock is changing at a rate of $-\dfrac{5}{2}$ 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.

$f(x) = -3x^3 + 2x + 1$ a = −2

$L(x) = -34x - 47$

✔ 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 $y = 7x^3 - 3\sqrt{5x}$.

$$dy = \boxed{\left(21x^2 - \frac{15}{2\sqrt{5x}}\right)} dx$$

✔ 3.9.23

Find dy.

$$y = \cos\left(13\sqrt{x}\right)$$

$$dy = \boxed{-\frac{13\sin 13\sqrt{x}}{2\sqrt{x}}} dx$$