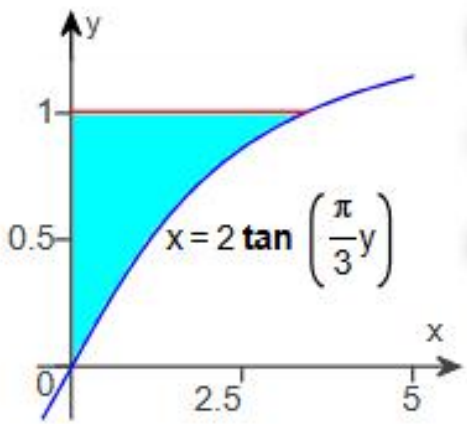
For the function given below, find a formula for the Riemann sum obtained by dividing the interval [a,b] into n equal subintervals and using the right-hand endpoint for each c_k. Then take a limit of this sum as $n \to \infty$ to calculate the area under the curve over [a,b].

$f(x) = 7x + 11x^2$ over the interval [0,1].

Find a formula for the Riemann sum.

$S_n =$ $\square$

Find the volume of the solid generated by revolving the shaded region about the y-axis.

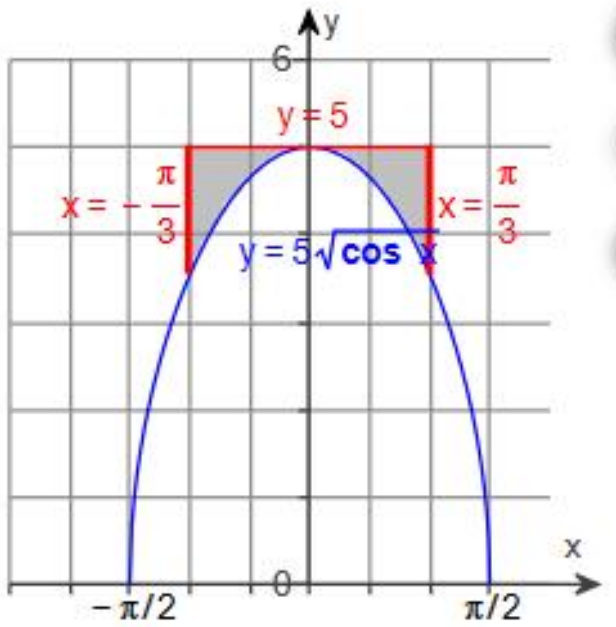


The volume of the solid generated by revolving the shaded region about the y-axis is ☐.
(Type an exact answer, using π as needed.)

Find the volume of the solid generated by revolving the region bounded by $y = 4x^2$, $y = 0$, and $x = 3$ about the x-axis.

The volume of the solid generated by revolving the region bounded by $y = 4x^2$, $y = 0$, and $x = 3$ about the x-axis is $\square$ cubic units.
(Type an exact answer, using π as needed.)

Use the washer method to find the volume of the solid generated by revolving the shaded region about the x-axis.



V = ☐

(Type an exact answer, using π as needed.)

Find the volume of the solid generated by revolving the region bounded by the given curve and lines about the x-axis.

$y = 5x,\ y = 5,\ x = 0$

$V =$ ☐

(Type an exact answer, using π as needed.)

Find the volume of the solid generated by revolving the region bounded by the graphs of $y = 2x^2 + 1$ and $y = 2x + 10$ about the x-axis.

The volume of the solid generated by revolving the region bounded by the graphs of $y = 2x^2 + 1$ and $y = 2x + 10$ about the x-axis is $\square$ cubic units.
(Round to the nearest hundredth.)

Find the volume of the solid generated by revolving the region bounded by $y = 4\sqrt{x}$ and the lines $y = 4\sqrt{13}$ and $x = 0$ about

a. the x-axis. **b**. the y-axis. **c**. the line $y = 4\sqrt{13}$. **d**. the line $x = 13$.

---

a. The volume of the solid generated by revolving the region bounded by $y = 4\sqrt{x}$ and the lines $y = 4\sqrt{13}$ and $x = 0$ about the x-axis is $\square$ cubic units.

(Type an exact answer, using π and radicals as needed, or type the answer as a decimal rounded to the nearest tenth.)

Find the volume of the solid generated by revolving the region bounded by the parabola $y = -\frac{x^2}{16}$ and the line $y = -1$ about the following lines.

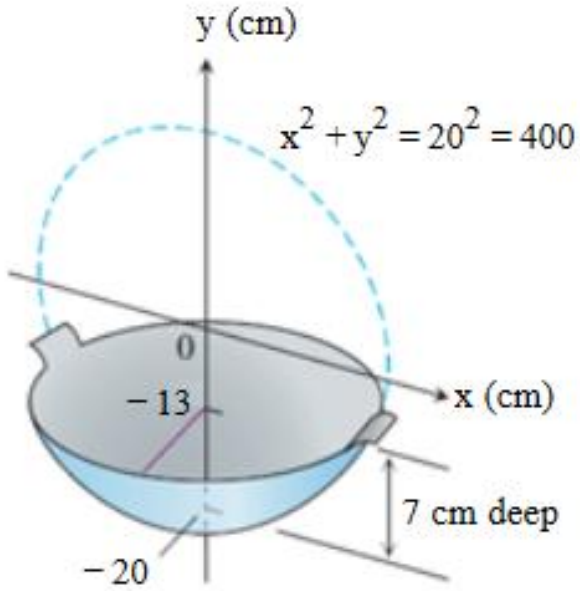
a. The line $y = -1$ **b.** The line $y = -2$ **c.** The line $y = 1$

---

a. The volume of the given solid is $\square$.

(Type an exact answer, using π as needed.)

A wok frying pan is shaped like a spherical bowl with handles. A bit of experimentation at home persuades a cook that a wok holds about 3 L if it is 7 cm deep and the sphere has a radius of 20 cm. To be sure, picture the wok as a solid of revolution, as shown in the figure, and calculate its volume with an integral. What is the real volume of the wok? (1 L = 1000 cm^3)



The volume of the wok is ☐ cm^3.

(Round to the nearest cubic centimeter as needed.)

Using rectangles each of whose height is given by the value of the function at the midpoint of the rectangle's base (the midpoint rule), estimate the area under the graph of the following function, using first two and then four rectangles.

$f(x) = \frac{2}{x}$ between $x = 5$ and $x = 9$

Using two rectangles, the estimate for the area under the curve is $\square$.

(Round to three decimal places as needed.)

Using rectangles whose height is given by the value of the function at the midpoint of the rectangle's base (the midpoint rule), estimate the area under the graph of the following function, using two and then four rectangles.

$y = 49 - x^2$ between $x = -7$ and $x = 7$

For two rectangles, area $\approx$ [ ]. (Type an integer or a decimal.)

The table below shows the velocity of an object (cm/sec) at each sec as it moves along a track for 10 sec. Estimate the distance traveled using ten subintervals of length 1 sec with left-endpoint values. Estimate the distance traveled using ten subintervals of length 1 sec with right-endpoint values.

Time (sec)	0	1	2	3	4	5	6	7	8	9	10
Velocity (cm/sec)	0	5	11	14	24	36	30	15	8	6	0

The distance traveled using ten subintervals of length 1 sec with left-endpoint values is ☐ cm.
(Simplify your answer.)

An object is dropped straight down from a helicopter. The object falls faster and faster but its acceleration (rate of change of its velocity) decreases over time because of air resistance. The acceleration is measured in ft/sec^2 and recorded every second after the drop for 5 sec, as shown. Find the following estimates.

t	0	1	2	3	4	5
a	32.00	19.41	11.77	7.14	4.33	2.63

a. Find an upper estimate for the speed when $t = 5$.

2.63 ft/sec

Use a finite sum to estimate the average value of f on the given interval by partitioning the interval into four subintervals of equal length and evaluating f at the subinterval midpoints.

$f(x) = x^3$ on $[0,2]$

The average value is $\square$. (Type an integer or a simplified fraction.)

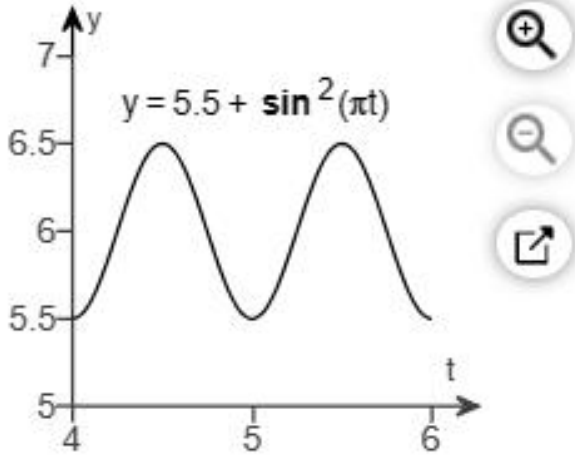
Use a finite sum to estimate the average value of f on the given interval by partitioning the interval into four subintervals of equal length and evaluating f at the subinterval midpoints.

$$f(x) = \frac{4}{x} \text{ on } [1,17]$$

The average value is $\square$. (Simplify your answer.)

Use a finite sum to estimate the average value of f on the given interval by partitioning the interval into four subintervals of equal length and evaluating f at the subinterval midpoints.

$f(t) = 5.5 + \sin^2(\pi t)$ on $[4,6]$



The estimated average value of $f(t) = 5.5 + \sin^2(\pi t)$ on $[4,6]$ is $\square$.

(Simplify your answer.)

A power plant generates electricity by burning oil. Pollutants produced as a result of the burning process are removed by scrubbers in the smokestacks. Over time, the scrubbers become less efficient and eventually they must be replaced when the amount of pollution released exceeds government standards. Measurements are taken at the end of each month determining the rate at which pollutants are released into the atmosphere, recorded as follows. Complete parts (a) and (b).

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Pollutant release rate (tons/day)	0.16	0.26	0.28	0.34	0.47	0.53	0.58	0.66	0.68	0.82	0.85	0.95

a. Assuming a 30-day month and that new scrubbers allow only 0.05 ton/day to be released, give an upper estimate of the total tonnage of pollutants released by the end of June. What is a lower estimate?

First, what should be the length of each subinterval?

(Type an integer or a decimal.)

Inscribe a regular n-sided polygon inside a circle of radius 1 and compute the area of the polygon for the following values of n.

a. 4 (square)
b. 8 (octagon)
c. 16
d. Compare the areas in parts (a), (b), and (c) with the area of the circle.

---

a. The area of the square is ☐ square units.
(Type an integer or decimal rounded to three decimal places as needed.)

Use technology to perform the following steps for $f(x) = 3 \sin 2x$ on $\left[0, \frac{\pi}{2}\right]$.

a. Plot the function over the given interval.
b. Subdivide the interval into n = 100, n = 200, n = 500 subintervals of equal length and evaluate the function
midpoint of each subinterval. Then compute the average value of the function values generated.
c. Solve the equation f(x) = (average value) for x using the average value calculated in part (b) for n = 500 p

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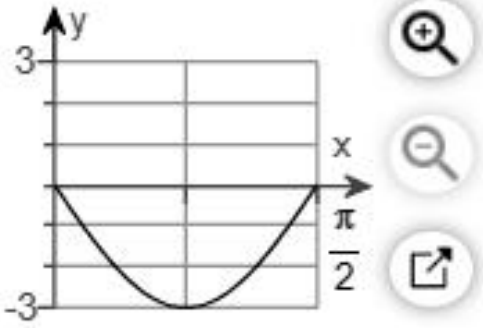
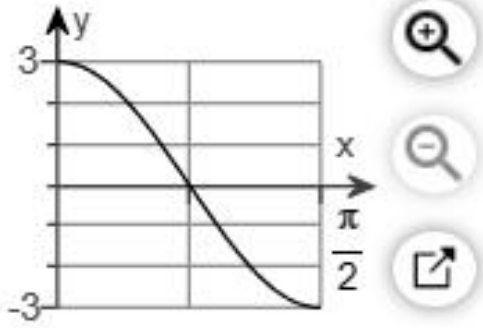
a. Plot the function over the given interval. Choose the correct answer below.

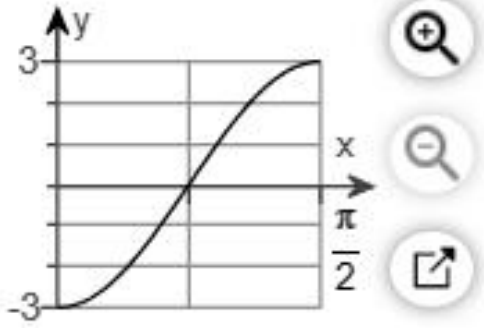
○ **A.**



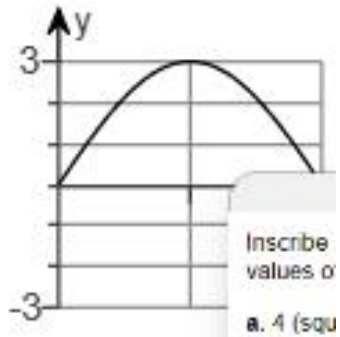
○ **B.**



○ **C.**



○ **D.**



Inscribe
values o
a. 4 (squ
b. 8 (oct
c. 16

The first derivative of a continuous function $y = f(x)$ is $y' = \left(20x - 10x^2\right)(5 - x)^2$. Find y'' and then use the graphing procedure to sketch the general shape of the graph of f.

$y'' =$ $\square$

Find the curve in the xy-plane that passes through the point $(4,10)$ and whose slope at each point is $6\sqrt{x}$.

$y =$ $\square$

Suppose that the equations shown below are true. Use these to find the following integrals in parts **a.** through **f.**

$$f(x) = \frac{d}{dx}\left(1 - 6\sqrt{x}\right), \quad g(x) = \frac{d}{dx}(5x + 4)$$

a. $\int f(x)dx = \square$

a. Identify the function's local extreme values in the given domain, and say where they occur.
b. Which of the extreme values, if any, are absolute?
c. Support your findings with a graphing calculator or computer grapher.

$$f(x) = \frac{x-6}{x^2-16}, \quad 0 \le x < 4$$

---

a. Find each local maximum, if there are any. Select the correct choice below and, if necessary, fill in the answer box(es) to complete your choice.

(Type an integer or a simplified fraction.)

- A. The function has a local maximum value at three values of x. In increasing order of x-value, the maximum values are f( ) = , f( ) = , and f( ) = .
- B. The function has a local maximum value at one value of x. The maximum value is f( ) = .
- C. The function has a local maximum value at two values of x. In increasing order of x-value, the maximum values are f( ) = and f( ) = .
- D. There are no local maxima.

Use Newton's method to estimate the solutions of the equation $7x^2 + x - 1 = 0$. Start with $x_0 = -1$ for the left solution and $x_0 = 1$ for the right solution. Find x_2 in each case.

Using Newton's method with $x_0 = -1$, the third approximation, x_2, to the left solution to $7x^2 + x - 1 = 0$ is $\square$.
(Round to four decimal places as needed.)

Use Newton's method to estimate the two zeros of the function $f(x) = x^4 - 2x - 15$. Start with $x_0 = -1$ for the left-hand zero and with $x_0 = 1$ for the zero on the right. Then, in each case, find x_2.

Determine x_2 when $x_0 = -1$.

$x_2 =$ ☐

(Simplify your answer. Round the final answer to four decimal places as needed. Round all intermediate values to four decimal places as needed.)

Use Newton's method to obtain the third approximation, x_2, of the positive fourth root of 11 by calculating the third approximation of the right 0 of $f(x) = x^4 - 11$. Start with $x_0 = 1$.

The third approximation of the fourth root of 11 determined by calculating the third approximation of the right 0 of $f(x) = x^4 - 11$, starting with $x_0 = 1$, is $\square$.

(Round to four decimal places.)

The curve $y = \tan x$ crosses the line $y = 3x$ at a non-zero x-value between $x = 0$ and $x = \frac{\pi}{2}$. Use Newton's method to find where the curves intersect. Compute successive approximations to find the solution to seven decimal places.

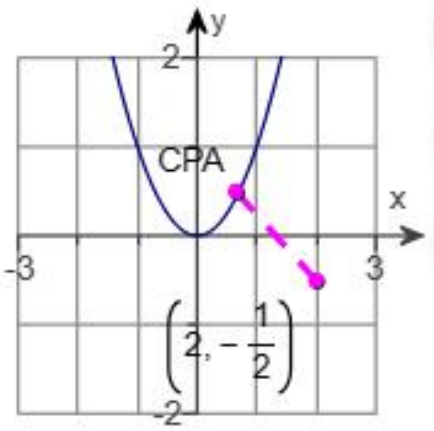
The curve $y = \tan x$ crosses the line $y = 3x$ at $x =$ $\square$.

(Type an integer or decimal rounded to seven decimal places as needed.)

How many solutions does the equation **sin** $2x = 1.55 - 2x^2$ have? Use Newton's method to find them. Compute successive approximations to find the solution(s) to five decimal places.

The equation has ☐ solution(s). (Type a whole number.)

In submarine location problems, it is often necessary to find a submarine's closest point of approach (CPA) to a sonobuoy (sound detector) in the water. Suppose that the submarine travels on the parabolic path $y = x^2$ and that the buoy is located at the point $\left(2, -\frac{1}{2}\right)$. Complete parts **a** and **b** below.



a. Show that the value of x that minimizes the distance between the submarine and the buoy is a solution of the equation $x = \frac{1}{x^2 + 1}$.

Identify the function whose value should be minimized. Choose the correct answer below.

A. $\sqrt{(x-2) + \left(x^2 + \frac{1}{2}\right)}$

B. $\sqrt{(x-2)^2 - \left(x^2 + \frac{1}{2}\right)^2}$

C. $\sqrt{\left(x - \frac{1}{2}\right)^2 + \left(x^2 + 2\right)^2}$

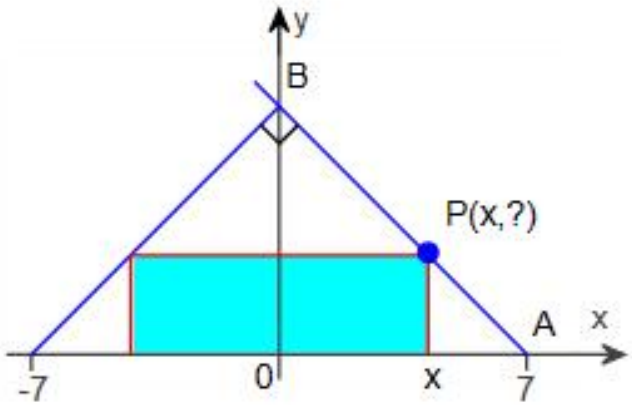
D. $\sqrt{(x-2)^2 + \left(x^2 + \frac{1}{2}\right)^2}$

The given figure shows a rectangle inscribed in an isosceles right triangle whose hypotenuse is 14 units long.

(a) Express the y-coordinate of P in terms of x. (Hint: Write an equation for the line AB.)

(b) Express the area of the rectangle in terms of x.

(c) What is the largest area the rectangle can have, and what are its dimensions?



(a) The expression for the y-coordinate of P is ☐.

(Type an expression using x as the variable.)

You are planning to make an open rectangular box from a 32-in.-by-63-in. piece of cardboard by cutting congruent squares from the corners and folding up the sides. What are the dimensions of the box of largest volume you can make this way, and what is its volume?

The dimensions of box of maximum volume are ☐ ▼

(Round to the nearest hundredth as needed. Use a comma to separate answers as needed.)

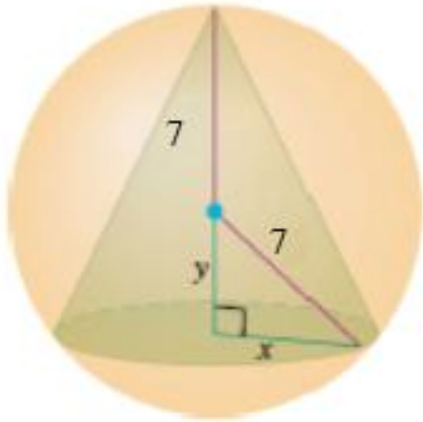
A rectangular plot of farmland will be bounded on one side by a river and on the other three sides by a single-strand electric fence. With 700 m of wire at your disposal, what is the largest area you can enclose, and what are its dimensions?

The maximum area of the rectangular plot is

A rectangular tank that is 2916 ft^3 with a square base and open top is to be constructed of sheet steel of a given thickness. Find the dimensions of the tank with minimum weight.

The dimensions of the tank with minimum weight are ☐ ft.
(Simplify your answer. Use a comma to separate answers.)

Find the volume of the largest right circular cone that can be inscribed in a sphere of radius 7.



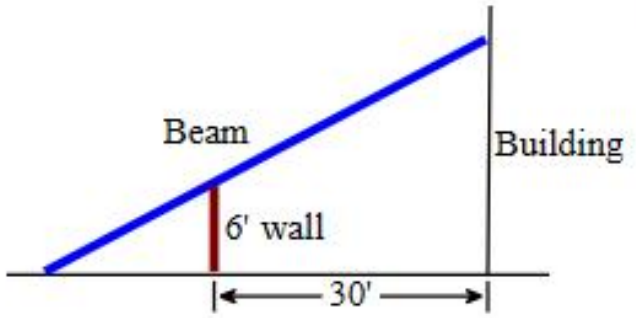
V = ☐ cubic units (Round to two decimal places as needed.)

The height (feet) of an object moving vertically is given by $s = -16t^2 + 256t + 192$, where t is in seconds. Find the object's velocity at $t = 6$, its maximum height and when it occurs, and its velocity when $s = 0$.

The velocity of the object at $t = 6$ seconds is ☐ ft/second.

(Simplify your answer. Type an integer or a decimal.)

The 6-ft wall shown here stands 30 ft from the building. Find the length of the shortest straight beam that will reach to the side of the building from the ground outside the wall.



The length of the shortest beam is ☐ ft.
(Round to the nearest tenth as needed.)

It costs 4 dollars to manufacture and distribute a backpack. If the backpacks sell at x dollars each, the number sold, n, is given by $n = \frac{5}{x-4} + 8(100 - x)$. Find the selling price that will maximize profit.

The selling price that will maximize profit is $\$\square$.
(Simplify your answer.)

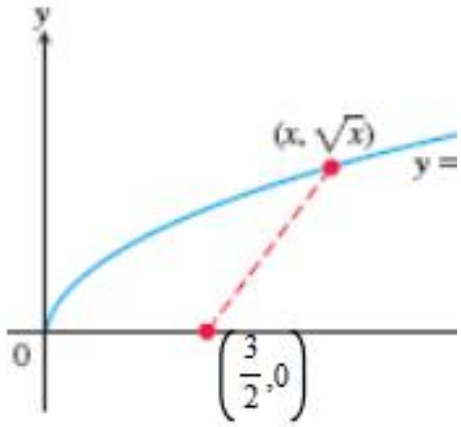
Suppose that $c(x) = 7x^3 - 70x^2 + 15{,}000x$ is the cost of manufacturing x items. Find a production level that will minimize the average cost of making x items.

The production level that minimizes the average cost of making x items is $x =$ ☐.

(Simplify your answer.)

a. How close does the curve $y = \sqrt{x}$ come to the point $\left(\frac{3}{2}, 0\right)$? (Hint: If the square of the distance is minimized, square roots can be avoided.)

b. Graph the distance function D(x) (the square of the distance) and $y = \sqrt{x}$ together and reconcile the result with the result in part (a).



a. First determine the function D(x), the square of the distance, from the curve $y = \sqrt{x}$ to the point $\left(\frac{3}{2}, 0\right)$, whose value must be minimized.

$D(x) =$ ☐

Find the critical points, domain endpoints, and extreme values (absolute and local) for the function.

$$y = x^{\frac{6}{7}}\left(x^2 - 8\right)$$

What is/are the x-value(s) of the critical point(s)? Select the correct choice below and, if necessary, fill in the answer box within your choice.

- **A.** The critical point(s) is/are at $x =$ ☐.
  (Round to the nearest thousandth as needed. Use a comma to separate answers as needed.)
- **B.** There are no critical points.

Find the absolute maximum and minimum values of the following function on the given interval. Then graph the function.

$$g(x) = -\sqrt{4 - x^2}, \quad -2 \le x \le 1$$

Find the absolute maximum value. Select the correct choice below and, if necessary, fill in the answer box to com your choice.

- A. The absolute maximum value ☐ occurs at x = ☐.
  (Type exact answers, using radicals as needed. Use a comma to separate answers as needed.)
- B. There is no absolute maximum.

Find the critical poi

Find the absolute maximum and minimum values of the following function on the given interval. Then graph the function. Identify the points on the graph where the absolute extrema occur.

$$f(\theta) = \cos\theta, \ -\frac{4\pi}{3} \le \theta \le 0$$

Find the absolute maximum. Select the correct choice below and, if necessary, fill in the answer boxes to complete your choice.

- **A.** The absolute maximum value ☐ occurs at $\theta =$ ☐.
  (Use a comma to separate answers as needed. Type exact answers, using π as needed.)
- **B.** There is no absolute maximum.

Determine all critical points for the following function.

$$f(x) = x^2 - 12x + 4$$

$x =$ ☐ (Use a comma to separate answers as needed.)

Determine all critical points for the following function.

$$f(x) = 3x(8 - x)^3$$

$x =$ ☐ (Use a comma to separate answers as needed.)

Find the critical points, domain endpoints, and local extreme values for the function.

$$y = x^{4/5}(x+2)$$

What is/are the critical point(s) or domain endpoint(s) where f' is undefined? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The critical point(s) or domain endpoint(s) where f' is undefined is/are at $x =$ ☐.
  (Type an integer or a simplified fraction. Use a comma to separate answers as needed.)
- **B.** There are no critical points or domain endpoints where f' is undefined.

Find the critical points, domain endpoints, and local extreme values for the function.

$$y = 4x\sqrt{4 - x^2}$$

What is/are the critical point(s) or domain endpoint(s) where f' is undefined? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The critical point(s) or domain endpoint(s) where f' is undefined is/are at $x =$ ☐.
  (Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- **B.** There are no critical points or domain endpoints where f' is undefined.

Find the value or values of c that satisfy the equation $\frac{f(b)-f(a)}{b-a} = f'(c)$ in the conclusion of the Mean Value Theorem for the given function on the given interval.

$$f(x) = x^{\frac{5}{2}};\ [0,1]$$

$c =$ ☐

(Use a comma to separate answers as needed.)

Find the value or values of c that satisfy the equation $\frac{f(b)-f(a)}{b-a} = f'(c)$ in the conclusion of the mean value theorem for the given function and interval.

$$f(x) = 9x + \frac{9}{x}, \left[\frac{1}{4}, 4\right]$$

$c =$ ☐ (Use a comma to separate answers as needed.)

Show that the function $f(t) = \sqrt{t} + \sqrt{1+t} - 4$ has exactly one zero in the interval $(0, \infty)$.

Solve the equation $\sqrt{t} + \sqrt{1+t} - 4 = 0$ to find the zeros of the given function.

$$\sqrt{t} + \sqrt{1+t} - 4 = 0$$
$$\sqrt{1+t} = 4 - \sqrt{t}$$
$$1 + t = \square$$

On a certain planet's moon, the acceleration due to gravity is 1.1 m/sec^2. If a rock is dropped into a crevasse, how fast will it be going just before it hits bottom 27 sec later?

The rock will be going ☐ m/sec.

By the Mean Value Theorem, $\min f' \leq \dfrac{f(b)-f(a)}{b-a} \leq \max f'$ for any interval [a,b] where $f'(x)$ is continuous. Let f be the function such that $f'(x) = \dfrac{1}{1+x^4 \cos(x)}$ and $f(0) = 2$. Note that $f'(x)$ is continuous wherever the denominator is not 0.

Use this inequality for $0 < x < 0.3$ to estimate f(0.3).

Give the value of f(0.3) accurate to one decimal place.

$f(0.3) \approx$ ☐

Answer the following questions about the function whose derivative is $f'(x) = (x-6)^2(x+9)$.

a. What are the critical points of f?

b. On what open intervals is f increasing or decreasing?

c. At what points, if any, does f assume local maximum and minimum values?

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a. Find the critical points, if any. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The critical point(s) of f is/are $x =$ ☐.
  (Simplify your answer. Use a comma to separate answers as needed.)
- **B.** The function f has no critical points.

Answer the following questions about the function whose derivative is $f'(x) = \frac{x^2(x-1)}{x+2}$, $x \neq -2$.

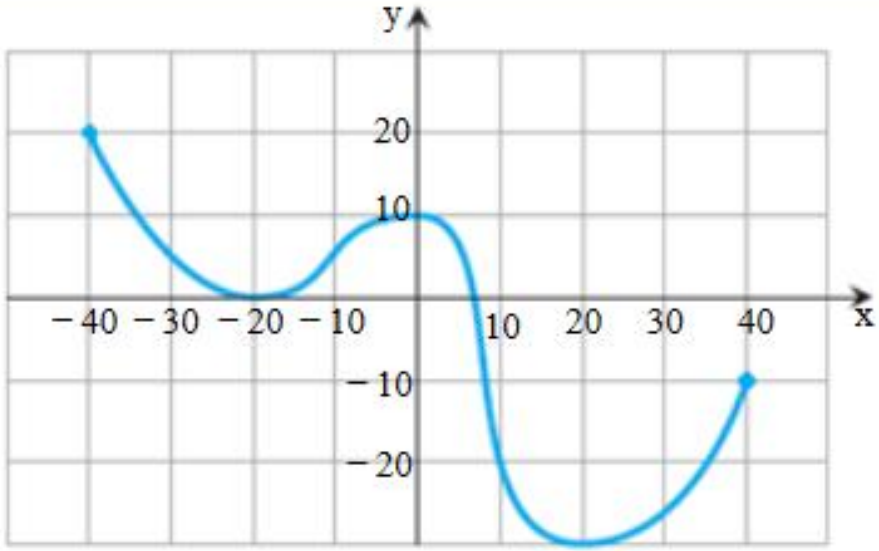
a. What are the critical points of f?
b. On what open intervals is f increasing or decreasing?
c. At what points, if any, does f assume local maximum and minimum values?

a. What are the critical points of f? Select the correct choice below and fill in the answer box within your choice.

- A. $x =$ ☐ (Use a comma to separate answers as needed)
- B. The function f has no critical points.

(a) Find the open intervals on which the function shown in the graph is increasing and decreasing.

(b) Identify the function's local and absolute extreme values, if any, saying where they occur.

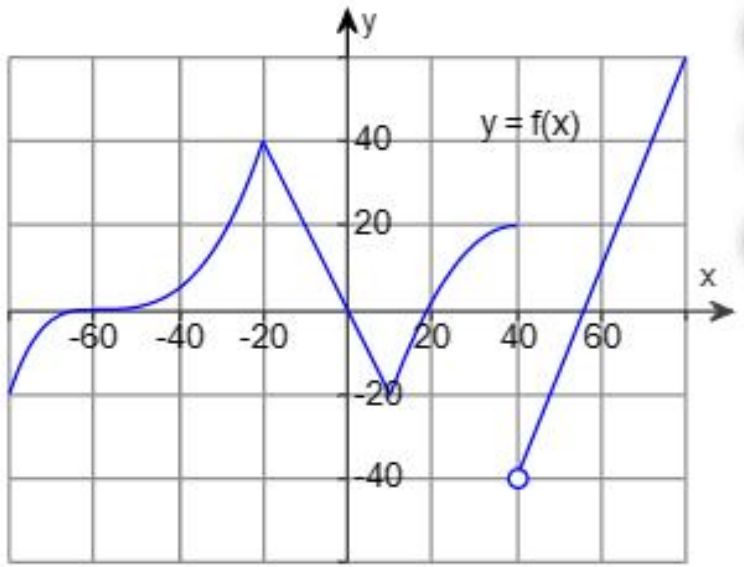


(a) On what open interval(s), if any, is the function increasing? Select the correct choice below and fill in any answer boxes within your choice.

- **A.** The function is increasing on the open interval(s) ☐.
  (Type your answer in interval notation. Use a comma to separate answers as needed.)
- **B.** The function is never increasing.

Answer the followin
a. What are the critic
b. On what open int
c. At what points, if

a. Find the open intervals on which the function shown in the graph is increasing and decreasing.
b. Identify the function's local and absolute extreme values, if any, saying where they occur.



a. On what open interval(s), if any, is the function increasing? Select the correct choice below and fill in any answer boxes within your choice.

- **A.** ☐
  (Type your answer in interval notation. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- **B.** The function is never increasing.

a. Identify the function's local extreme values in the given domain, and say where they occur.
b. Which of the extreme values, if any, are absolute?
c. Support your findings with a graphing calculator or computer grapher.

$f(x) = (x-1)^2, \ -\infty < x \leq 2$

---

a. Find each local maximum, if there are any. Select the correct choice below and, if necessary, fill in the answer box(es) to complete your choice.

(Type an integer or a simplified fraction.)

- **A.** The function has a local maximum value at three values of x. In increasing order of x-value, the maximum values are $f(\square) = \square$, $f(\square) = \square$, and $f(\square) = \square$.
- **B.** The function has a local maximum value at two values of x. In increasing order of x-value, the maximum values are $f(\square) = \square$ and $f(\square) = \square$.
- **C.** The function has a local maximum value at one value of x. The maximum value is $f(\square) = \square$.
- **D.** There are no local maxima.

a. Identify the function's local extreme values in the given domain, and say where they occur.
b. Which of the extreme values, if any, are absolute?
c. Support your findings with a graphing calculator or computer grapher.

$$f(x) = -x^2 - 8x - 7, \quad -6 \le x < \infty$$

---

a. Find each local maximum, if there are any. Select the correct choice below and, if necessary, fill in the answer box(es) to complete your choice.

(Type an integer or a simplified fraction.)

- **A.** The function has a local maximum value at one value of x. The maximum value is $f(\square) = \square$.
- **B.** The function has a local maximum value at two values of x. In increasing order of x-value, the maximum values are $f(\square) = \square$ and $f(\square) = \square$.
- **C.** The function has a local maximum value at three values of x. In increasing order of x-value, the maximum values are $f(\square) = \square$, $f(\square) = \square$, and $f(\square) = \square$.
- **D.** There are no local maxima.

Sketch the graph of a differentiable function $y = f(x)$ through the point $(4,4)$ if $f'(4) = 0$ and satisfies the conditions given below.

(a) $f'(x) > 0$ for $x < 4$ and $f'(x) < 0$ for $x > 4$

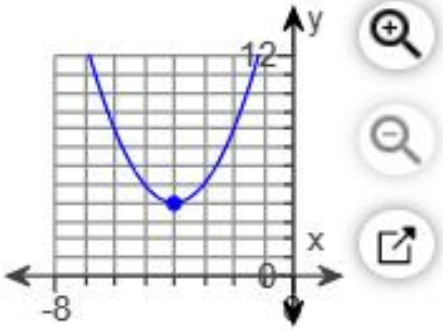
(b) $f'(x) < 0$ for $x < 4$ and $f'(x) > 0$ for $x > 4$

(c) $f'(x) > 0$ for $x \neq 4$

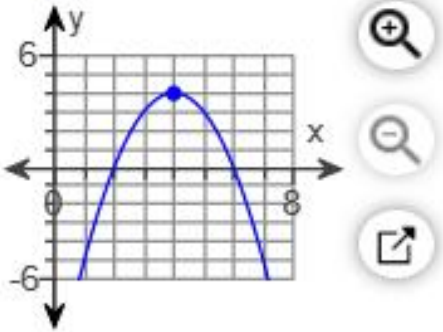
(d) $f'(x) < 0$ for $x \neq 4$

(a) Choose the correct graph below.

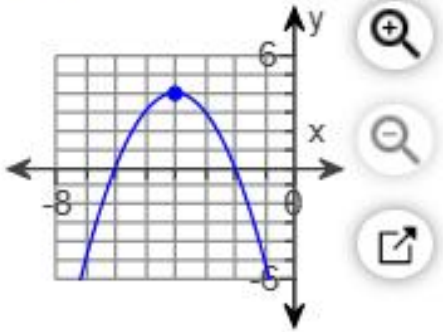
○ **A.**



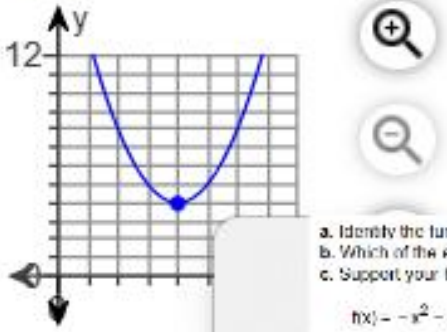
○ **B.**



○ **C.**



○ **D.**



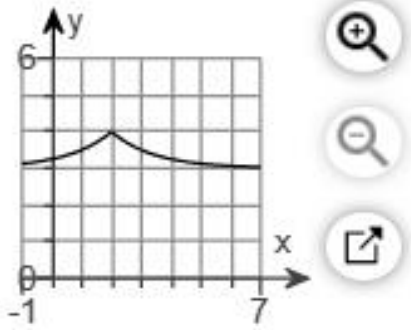
Sketch the graph of a continuous function $y = g(x)$ that satisfies the conditions given below.

(a) $g(2) = 4$, $0 < g' < 1$ for $x < 2$, $g'(x) \to 1^-$ as $x \to 2^-$, $-1 < g' < 0$ for $x > 2$, and $g'(x) \to -1^+$ as $x \to 2^+$.

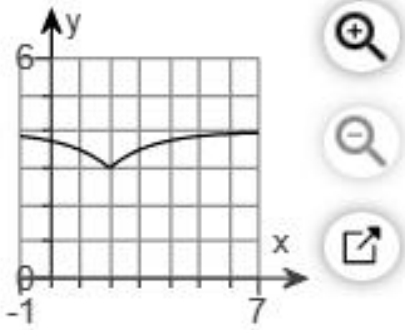
(b) $g(2) = 4$, $g' < 0$ for $x < 2$, $g'(x) \to -\infty$ as $x \to 2^-$, $g' > 0$ for $x > 2$, and $g'(x) \to \infty$ as $x \to 2^+$.

(a) Choose the correct graph below.

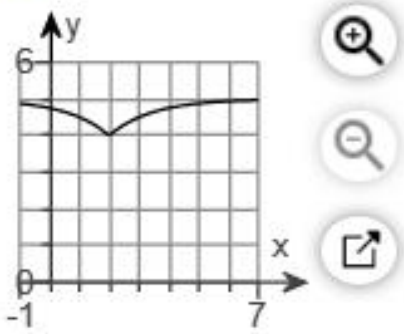
A.



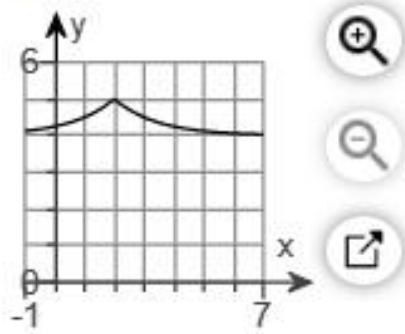
B.



C.



D.



Determine the values of constants a, b, c, and d so that $f(x) = ax^3 + bx^2 + cx + d$ has a local maximum at the point (0,0) and a local minimum at the point (1, − 17).

Determine the values of a, b, c, and d.

a = ☐, b = ☐, c = ☐, d = ☐

Find the critical points, domain endpoints, and local extreme values for the function.

$$y = 5x\sqrt{4 - x^2}$$

What is/are the critical point(s) or domain endpoint(s) where f' is undefined? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The critical point(s) or domain endpoint(s) where f' is undefined is/are at $x =$ ☐.
  (Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- **B.** There are no critical points or domain endpoints where f' is undefined.

The function $V(x) = x(20 - 2x)(16 - x)$, $0 < x < 10$, models the volume of a box.

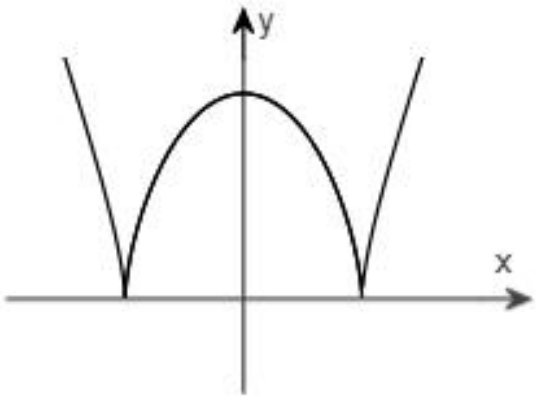
(a) Find the extreme values of V.
(b) Interpret any values found in part **(a)** in terms of the volume of the box.

(a) The extreme value(s) of V is/are $\square$.
(Use a comma to separate answers as needed.)

Identify the inflection points and local maxima and minima of the following function.

$$y = \frac{3}{13}\left(x^2 - 25\right)^{\frac{2}{3}}$$

The graph of the function is shown to the right. Identify the open intervals on which the function is differentiable and is concave up and concave down.

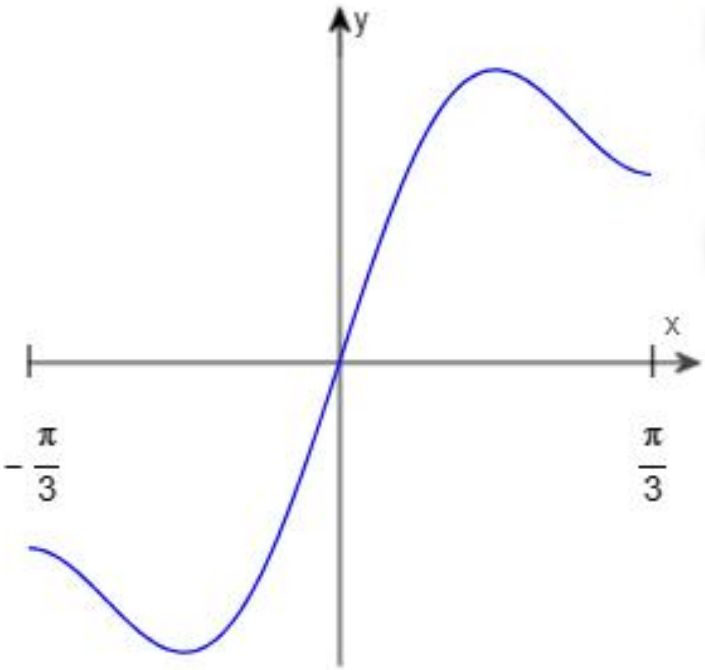


Find the inflection points of the curve. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The inflection point(s) is/are ☐.
  (Type an ordered pair. Use a comma to separate answers as needed.)
- **B.** There are no inflection points.

Identify the inflection points and local maxima and minima of the function graphed to the right. Identify the open intervals on which the function is differentiable and is concave up and concave down.

$y = 2x + \sin 4x, \ -\frac{\pi}{3} \le x \le \frac{\pi}{3}$



Find the inflection point(s). Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The point(s) is/are ☐.
  (Type an ordered pair. Use a comma to separate answers as needed.)
- **B.** There are no inflection points.

Identify the coordinates of any local and absolute extreme points and inflection points. Graph the function $y = x^2 - 12x + 35$.

Identify the coordinates of any local maximum points. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The local maximum point(s) is/are ☐.
  (Type an ordered pair. Use a comma to separate answers as needed.)
- **B.** There are no local maximum points.

Identify the coordinates of any local and absolute extreme points and inflection points. Graph the function.

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

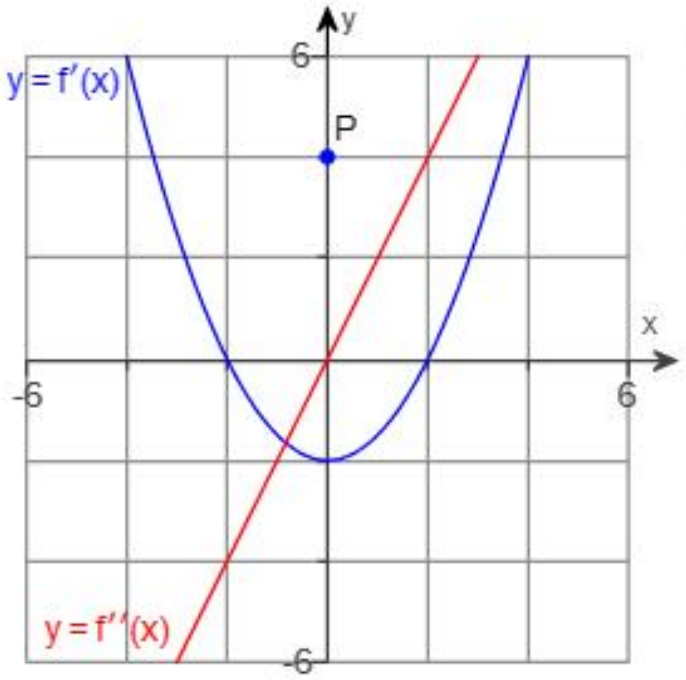
Identify the coordinates of the local maximum points. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The local maximum point(s) is/are ☐.
  (Type an ordered pair. Use a comma to separate answers as needed.)
- **B.** There are no local maximum points.

The first derivative of a continuous function $y = f(x)$ is $y' = (x+5)^{-2/3}$. Find y'' and then use the graphing procedure to sketch the general shape of the graph of f.

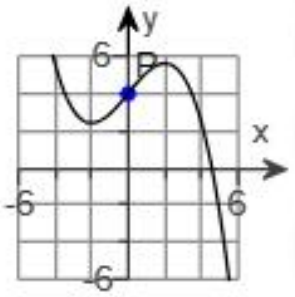
$y'' =$ □

The given figure shows the graphs of the first and second derivatives of a function y = f(x). Sketch the approximate graph of f, given that the graph passes through the point P.

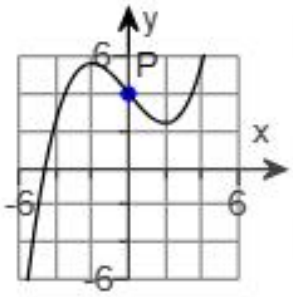


Which of the following is the correct graph of the function y = f(x)?

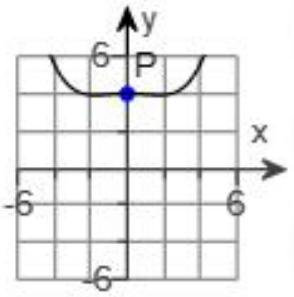
A.



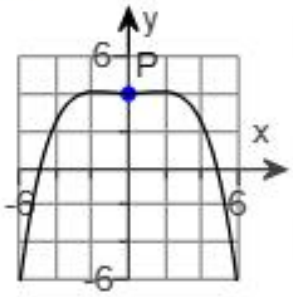
B.



C.



D.



Suppose the derivative of the function $y = f(x)$ is $y' = (x-3)^2(x-1)$. At what points, if any, does the graph of f have a local minimum, local maximum, or point of inflection? (Hint: Draw the sign pattern for y'.)

At what points, if any, does the graph of f have a local minimum?

- **A.** The graph has a local minimum at $x =$ ☐.
  (Type an integer or a simplified fraction. Use a comma to separate answers as needed.)
- **B.** The graph has no local minimum.