Chap 6 HW -- Integration Application (11708641)

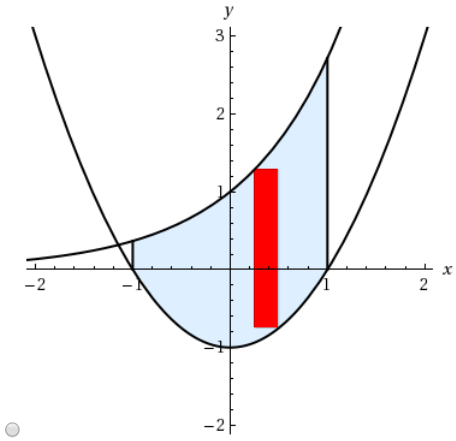
Due: Fri, May 31, 2019 12:00 AM MST

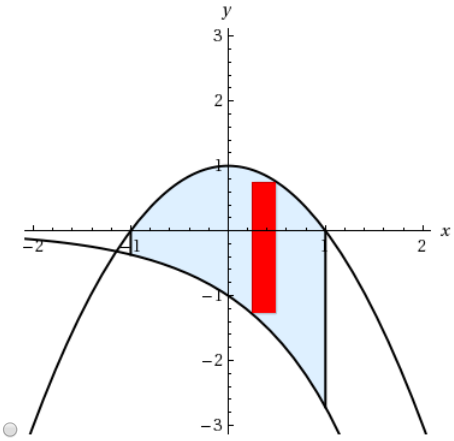
Question 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35

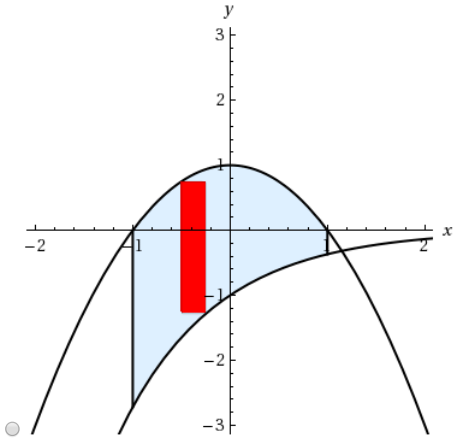
1. Question Details SCalcET8 6.1.005. [3804909]

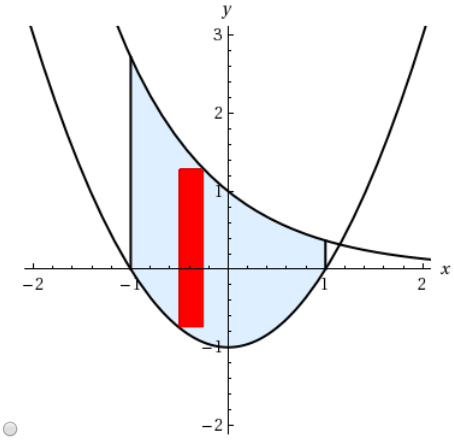
Sketch the region enclosed by the given curves. Decide whether to integrate with respect to x or y. Draw a typical approximating rectangle.

$y = e^x,\ y = x^2 - 1,\ x = -1,\ x = 1$







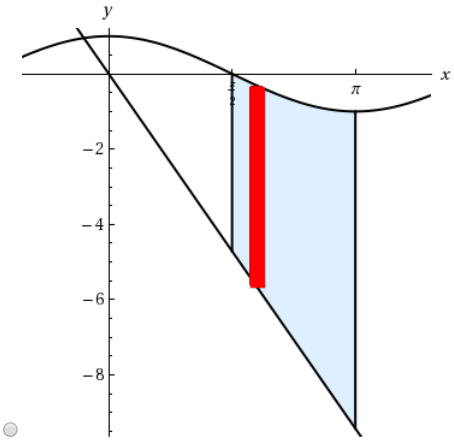


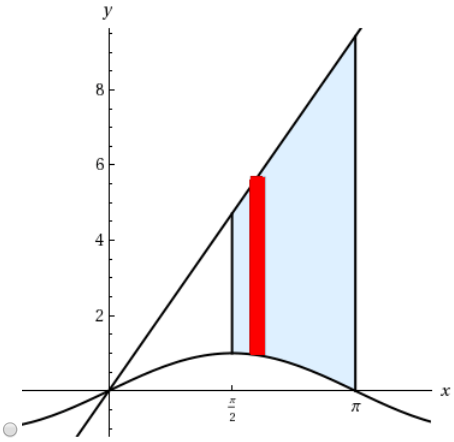
Find the area of the region.

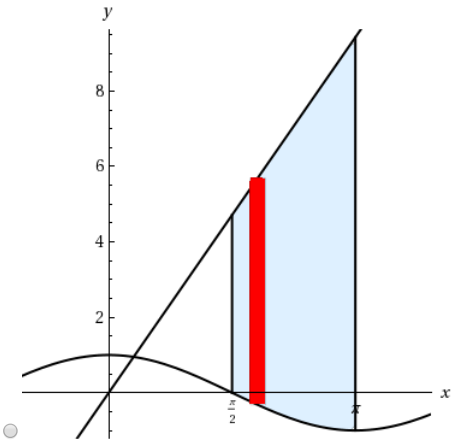
2. Question Details SCalcET8 6.1.006. [3804949]

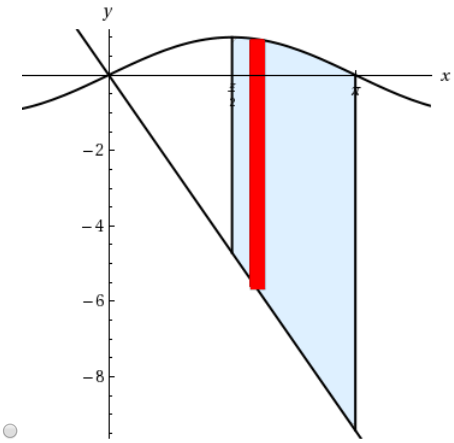
Sketch the region enclosed by the given curves. Decide whether to integrate with respect to x or y. Draw a typical approximating rectangle.

$y = \sin(x),\ y = 3x,\ x = \pi/2,\ x = \pi$







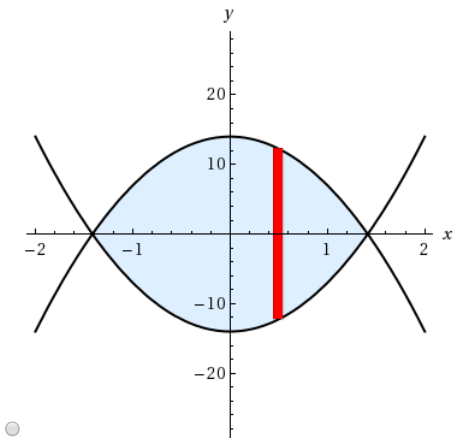


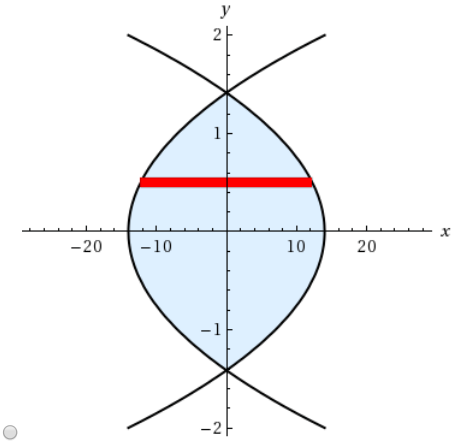
Find the area of the region.

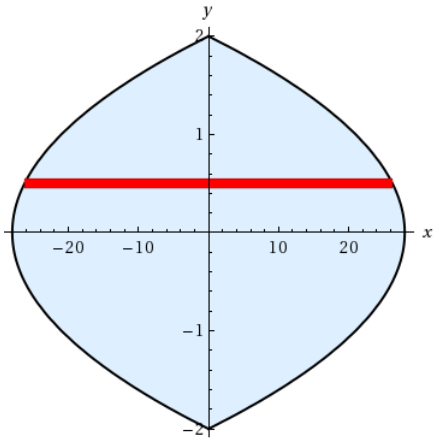
3. Question Details SCalcET8 6.1.011.MI. [3804878]

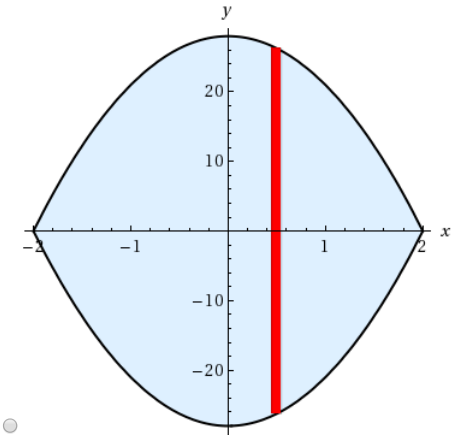
Sketch the region enclosed by the given curves. Decide whether to integrate with respect to x or y. Draw a typical approximating rectangle.

$x = 28 - 7y^2, \quad x = 7y^2 - 28$









Find the area of the region.

4. Question Details SCalcET8 6.1.011.MI.SA. [3805283]

This question has several parts that must be completed sequentially. If you skip a part of the question, you will not receive any points for the skipped part, and you will not be able to come back to the skipped part.

Tutorial Exercise

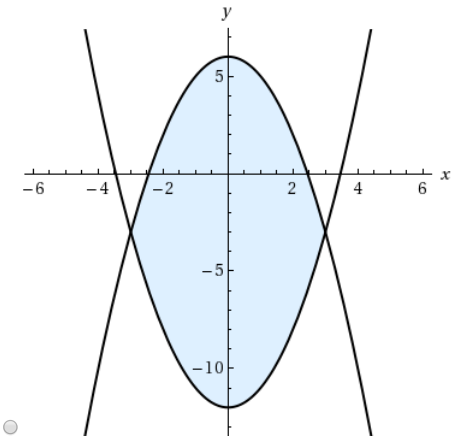
Sketch the region enclosed by the given curves. Decide whether to integrate with respect to x or y. Draw a typical approximating rectangle. Find the area of the region.

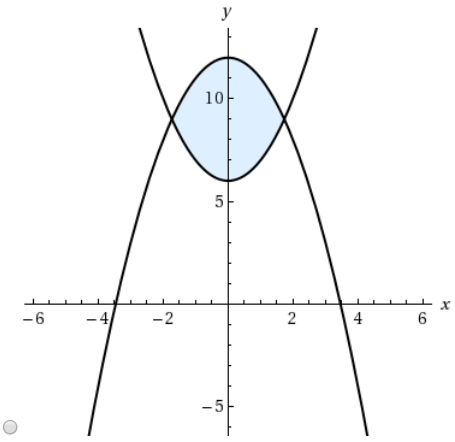
$x = 2 - 2y^2, \quad x = 2y^2 - 2$

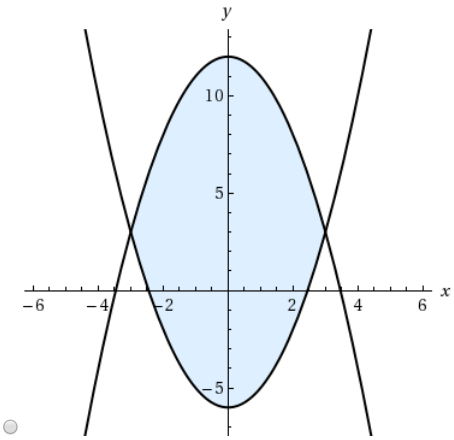
5. Question Details SCalcET8 6.1.013. [3804737]

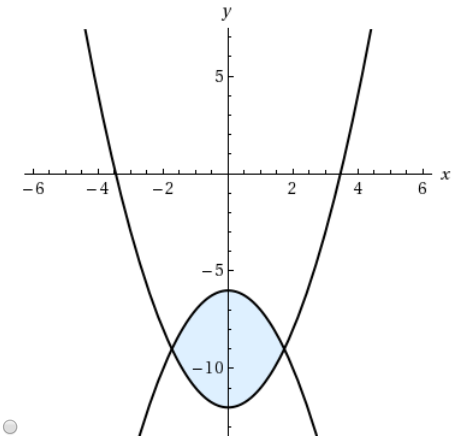
Sketch the region enclosed by the given curves.

$y = 12 - x^2, \quad y = x^2 - 6$







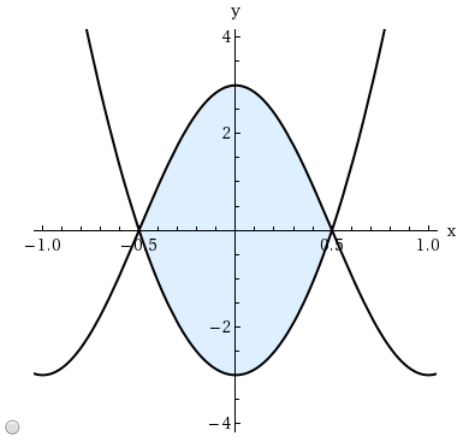


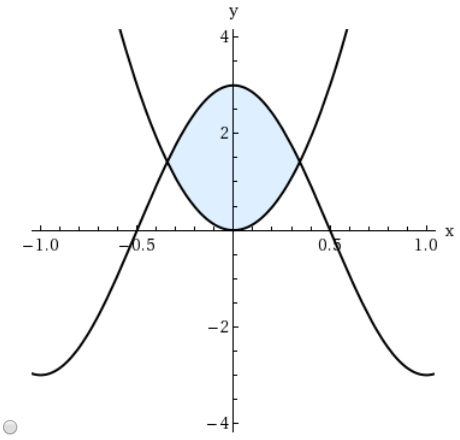
Find its area.

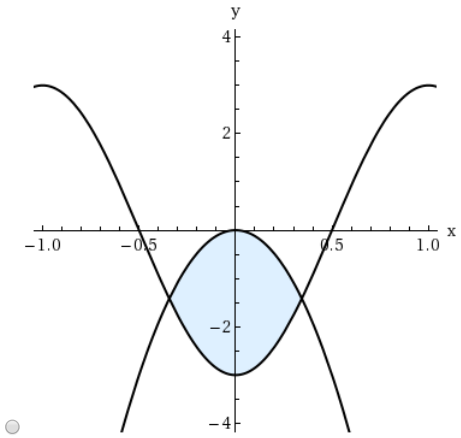
6. Question Details SCalcET8 6.1.019. [3805711]

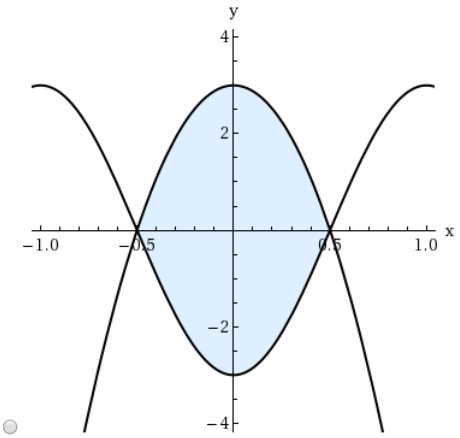
Sketch the region enclosed by the given curves.

$y = 3\cos(\pi x), \quad y = 12x^2 - 3$









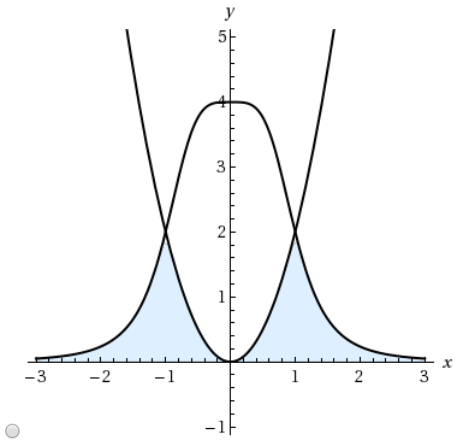
Find its area.

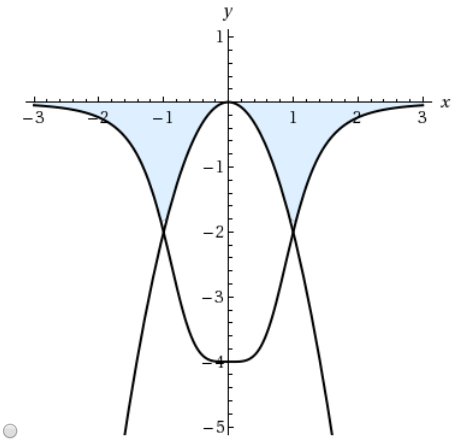
7. Question Details SCalcET8 6.1.041. [3805423]

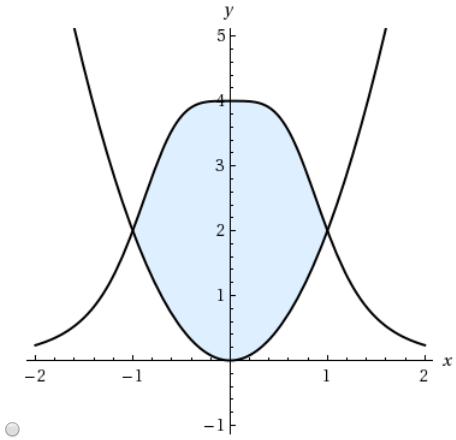
A graphing calculator is recommended.

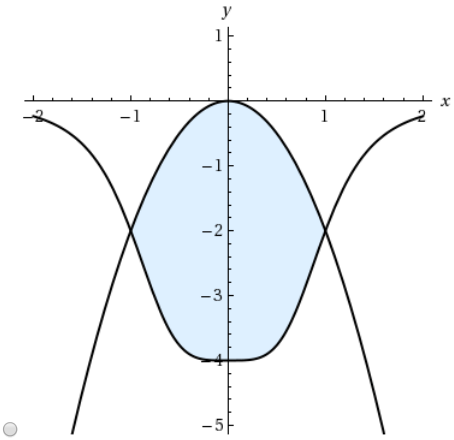
Graph the region between the curves.

$y = \frac{4}{1 + x^4}, \quad y = 2x^2$









Compute the area correct to five decimal places.

8. Question Details SCalcET8 6.1.050. [3805345]

The birth rate of a population is $b(t) = 2100e^{0.023t}$ people per year and the death rate is $d(t) = 1420e^{0.015t}$ people per year, find the area between these curves for $0 \le t \le 10$. (Round your answer to the nearest integer.)

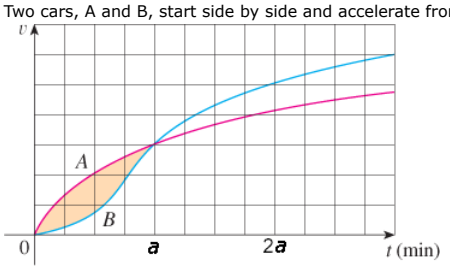
people

What does this area represent?

- This area represent the number of children through high school over a 10-year period.
- This area represents the number of deaths over a 10-year period.
- This area represents the number of births over a 10-year period.
- This area represents the decrease in population over a 10-year period.
- This area represents the increase in population over a 10-year period.

9. Question Details SCalcET8 6.1.053. [3805446]

Two cars, A and B, start side by side and accelerate from rest. The figure shows the graphs of their velocity functions and $a = 3$.



(a) Which car is ahead after three minutes?

- car A
- car B

Explain.

- The area under curve A is greater than the area under curve B.
- The area under curve B is greater than the area under curve A.

(b) What is the meaning of the area of the shaded region?

- It is how much faster A is traveling than B after 3 minutes.
- It is how much faster B is traveling than A after 3 minutes.
- It is the distance by which A is ahead of B after 3 minutes.
- It is the distance by which B is ahead of A after 3 minutes.

(c) Which car is ahead after six minutes?

- car A
- car B

Explain.

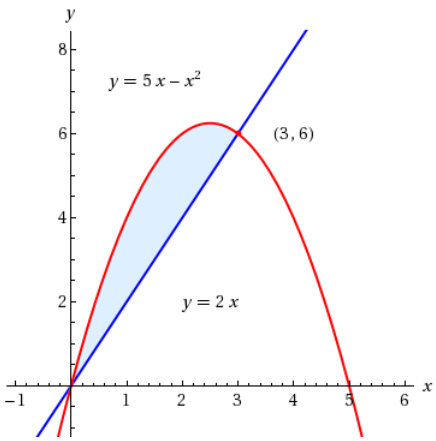
- The area under curve A is greater than the area under curve B.
- The area under curve B is greater than the area under curve A.

(d) Estimate the time t at which the cars are again side by side.

$t =$ ____ min

10. Question Details SCalcET8 6.1.501.XP.MI. [3805362]

Find the area of the shaded region.

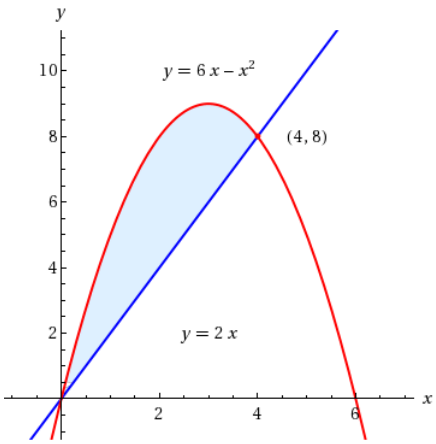


11. Question Details SCalcET8 6.1.501.XP.MI.SA. [3805122]

This question has several parts that must be completed sequentially. If you skip a part of the question, you will not receive any points for the skipped part, and you will not be able to come back to the skipped part.

Tutorial Exercise

Find the area of the shaded region.



12. Question Details SCalcET8 6.5.001. [3805131]

Find the average value f_{ave} of the function f on the given interval.

$f(x) = 3x^2 + 8x, \quad [-1, 4]$

$f_{ave} =$

13. Question Details SCalcET8 6.5.002. [3805177]

Find the average value f_{ave} of the function f on the given interval.

$f(x) = \sqrt{x}, \quad [0, 25]$

$f_{ave} =$

14. Question Details SCalcET8 6.5.005. [3804943]

Find the average value f_{ave} of the function f on the given interval.

$f(t) = e^{\sin(t)} \cos(t), \quad [0, \pi/2]$

$f_{ave} =$

15. Question Details SCalcET8 6.5.008. [3804597]

Find the average value h_{ave} of the function h on the given interval.

$h(u) = (\ln(u))/u, \quad [1, 7]$

$h_{ave} =$

16. Question Details SCalcET8 6.5.017.MI.SA. [3805221]

This question has several parts that must be completed sequentially. If you skip a part of the question, you will not receive any points for the skipped part, and you will not be able to come back to the skipped part.

Tutorial Exercise

In a certain city the temperature (in °F) t hours after 9 AM was modeled by the function

$$T(t) = 41 + 18 \sin\left(\frac{\pi t}{12}\right).$$

Find the average temperature T_{ave} during the period from 9 AM to 9 PM.

17. Question Details SCalcET8 6.5.021. [3805640]

In the example we modeled the world population in the second half of the 20th century by the equation $P(t) = 2560e^{0.017185t}$. Use this equation to estimate the average world population during the time period of 1950 to 1970. (Round your answer to the nearest million.)

[ ] million people

18. Question Details SCalcET8 6.4.002. [3805471]

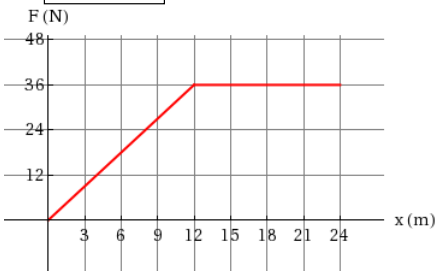
How much work is done when a hoist lifts a 290-kg rock to a height of 3 m? (Use 9.8 m/s^2 for the acceleration due to gravity.)

[ ] J

19. Question Details SCalcET8 6.4.005. [3805707]

Shown is the graph of a force function (in newtons) that increases to its maximum value and then remains constant. How much work W is done by the force in moving an object a distance of 24 m?

W = [ ] J



20. Question Details SCalcET8 6.4.007.MI. [3805729]

A force of 14 lb is required to hold a spring stretched 8 in. beyond its natural length. How much work W is done in stretching it from its natural length to 11 in. beyond its natural length?

W = [ ] ft-lb

21. Question Details SCalcET8 6.4.501.XP. [3804657]

A spring has a natural length of 22 cm. If a 20-N force is required to keep it stretched to a length of 34 cm, how much work W is required to stretch it from 22 cm to 28 cm? (Round your answer to two decimal places.)

W = [ ] J

22. Question Details SCalcET8 6.4.502.XP. [3805307]

How much work W is done in lifting a 5-kg sandbag to a height of 6.5 m? (Use 9.8 m/s^2 for g. Round your answer to the nearest integer.)

W = [ ] J

23. Question Details SCalcET8 6.4.504.XP. [3805465]

Find the work W done if a constant force of 110 lb is used to pull a cart a distance of 240 ft.

W = [ ] ft-lb

24. Question Details SCalcET8 6.4.AE.001. [3804653]

Video Example

EXAMPLE 1

(a) How much work is done in lifting a 1.3-kg book off the floor to put it on a desk that is 0.8 m high? Use the fact that the acceleration due to gravity is $g = 9.8$ m/s^2.

(b) How much work is done in lifting a 22-lb weight 5 ft off the ground?

SOLUTION

(a) The force exerted is equal and opposite to that exerted by gravity, so the force is

$$F = m\frac{d^2s}{dt^2} = mg = (1.3)(9.8) = \boxed{} \text{ N}$$

and then the work done is

$$W = Fd = \left(\boxed{}\right)(0.8) = \boxed{} \text{ J}.$$

(b) Here the force is given as $F = 22$ lb, so the work done is

$$W = Fd = 22 \cdot 5 = \boxed{} \text{ ft-lb}.$$

Notice that in part (b), unlike part (a), we did not have to multiply by g because we were given the *weight* (which is a force) and not the mass of the object.

25. Question Details SCalcET8 6.4.AE.003. [3805678]

Video Example

EXAMPLE 3 A force of 60 N is required to hold a spring that has been stretched from its natural length of 15 cm to a length of 20 cm. How much work is done in stretching the spring from 20 cm to 25 cm?

SOLUTION According to Hooke's Law, the force required to hold the spring stretched x meters beyond its natural length is $f(x) = kx$. When the spring is stretched from 15 cm to 20 cm, the amount stretched is 5 cm = $\boxed{}$ m. This means that $f(0.05) = \boxed{}$, so

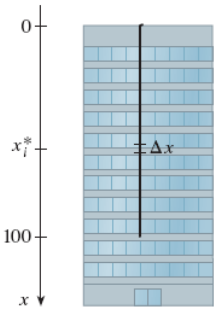
$$0.05k = 60 \qquad k = \frac{60}{0.05} = \boxed{}.$$

Thus $f(x) = 1200x$ and the work done in stretching the spring from 20 cm to 25 cm is

$$W = \int_{0.05}^{0.1} 1200x\,dx = 1200\frac{x^2}{2}\Big]_{0.05}^{0.1}$$

$$= 600\left[\left(\boxed{}\right)^2 - (0.05)^2\right] = \boxed{} \text{ J}.$$

26. Question Details SCalcET8 6.4.AE.004. [3805616]



Video Example

EXAMPLE 4 A 200-lb cable is 100 ft long and hangs vertically from the top of a tall building. How much work is required to lift the cable to the top of the building?

SOLUTION Here we don't have a formula for the force function, but we can use an argument similar to the one that led to the definition of work.

Let's place the origin at the top of the building and the x-axis pointing downward as in the figure. We divide the cable into small parts with length Δx. If x_i^* is a point in the ith such interval, then all points in the interval are lifted by approximately the same amount, namely x_i^*. The cable weighs $\boxed{}$ pounds per foot, so the weight of the ith part is $2\,\Delta x$. Thus the work done on the ith part, in foot-pounds, is

$$\underbrace{(2\Delta x)}_{\text{force}} \cdot \underbrace{x_i^*}_{\text{distance}} = 2x_i^*\Delta x.$$

We get the total work done by adding all these approximations and letting the number of parts become large (so $\Delta x \to 0$):

$$W = \lim_{n\to\infty}\sum_{i=1}^{n} 2x_i^*\Delta x = \int_0^{100} 2x\,dx$$

$$= \boxed{}\Big]_0^{100} = \boxed{} \text{ ft-lb}.$$

27. Question Details SCalcET8 12.3.049.MI. [3875121]

Find the work done by a force $\mathbf{F} = 8\mathbf{i} - 6\mathbf{j} + 5\mathbf{k}$ that moves an object from the point $(0, 6, 8)$ to the point $(4, 14, 24)$ along a straight line. The distance is measured in meters and the force in newtons.

$\boxed{}$ J

28. Question Details SCalcET8 12.3.049.MI.SA. [3800180]

This question has several parts that must be completed sequentially. If you skip a part of the question, you will not receive any points for the skipped part, and you will not be able to come back to the skipped part.

Tutorial Exercise

Find the work done by a force $\mathbf{F} = 6\mathbf{i} - 8\mathbf{j} + 6\mathbf{k}$ that moves an object from the point $(0, 5, 7)$ to the point $(7, 15, 23)$ along a straight line. The distance is measured in meters and the force in newtons.

29. Question Details SCalcET8 12.3.050. [3799781]

A tow truck drags a stalled car along a road. The chain makes an angle of 30° with the road and the tension in the chain is 1900 N. How much work is done by the truck in pulling the car 1 km?

J

30. Question Details SCalcET8 12.3.051. [3799863]

A sled is pulled along a level path through snow by a rope. A 25-lb force acting at an angle of 35° above the horizontal moves the sled 70 ft. Find the work done by the force. (Round your answer to the nearest whole number.)

ft-lb

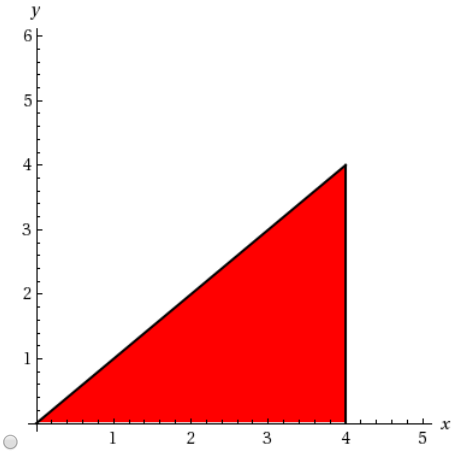
31. Question Details SCalcET8 6.2.001. [3805753]

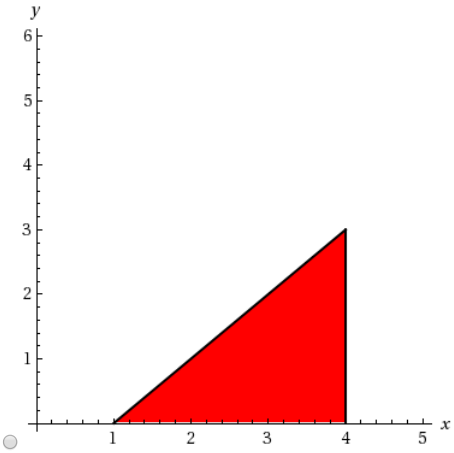
Find the volume V of the solid obtained by rotating the region bounded by the given curves about the specified line.

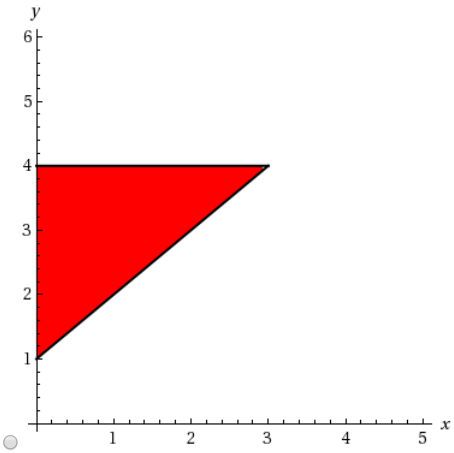
$y = x + 1,\ y = 0,\ x = 0,\ x = 4;$ about the x-axis

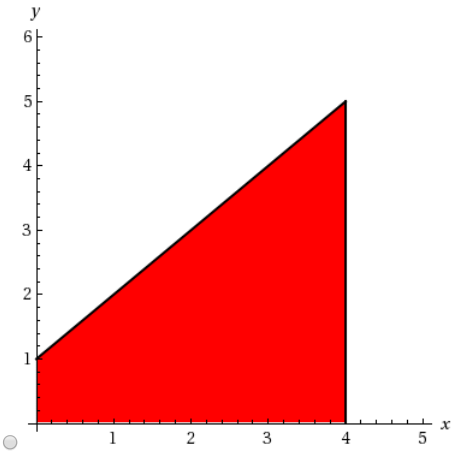
$V =$

Sketch the region.

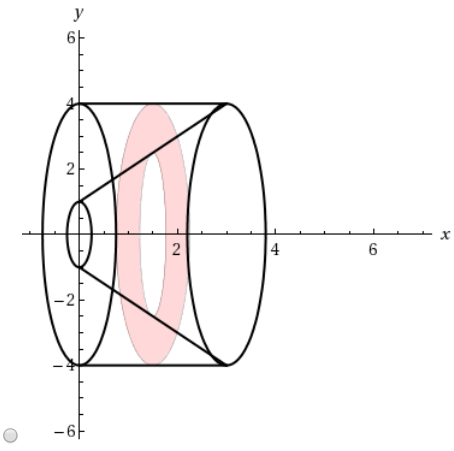


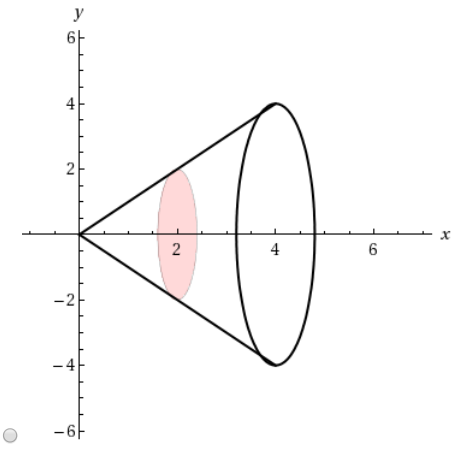


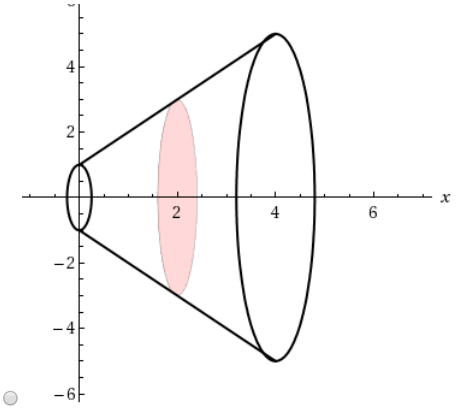


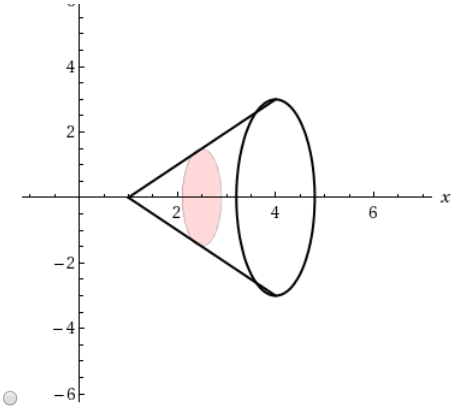


Sketch the solid, and a typical disk or washer.






4
2
2
4
6
x
−2
−4
−6


4
2
2
4
6
x
−2
−4
−6

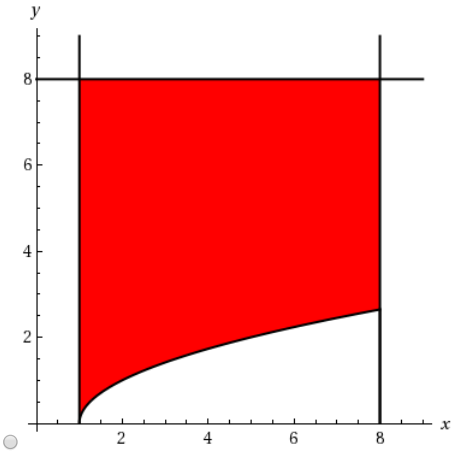
32. Question Details SCalcET8 6.2.003. [3805595]

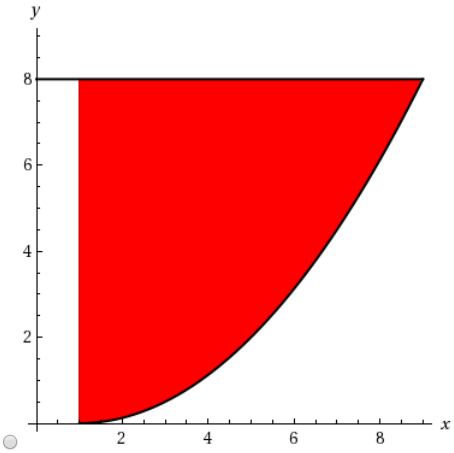
Find the volume V of the solid obtained by rotating the region bounded by the given curves about the specified line.

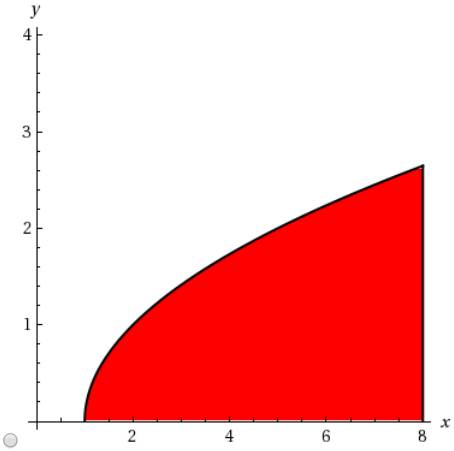
$y = \sqrt{x - 1}$, $y = 0$, $x = 8$; about the x-axis

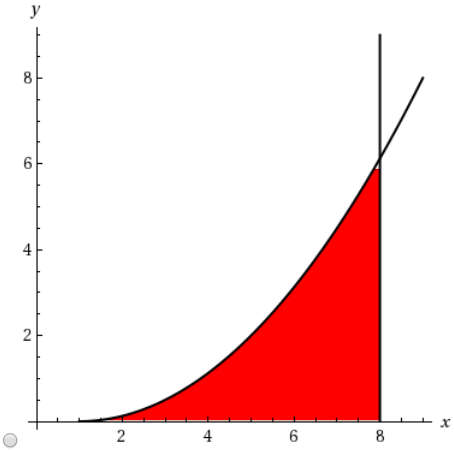
$V =$

Sketch the region.

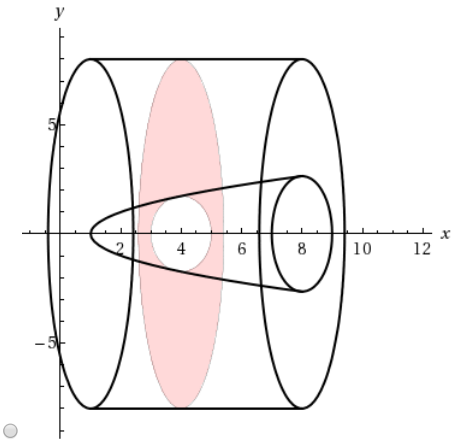


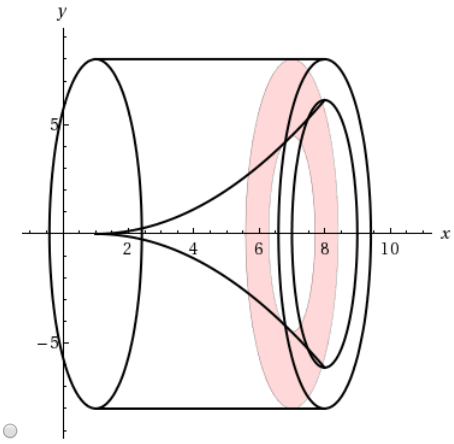


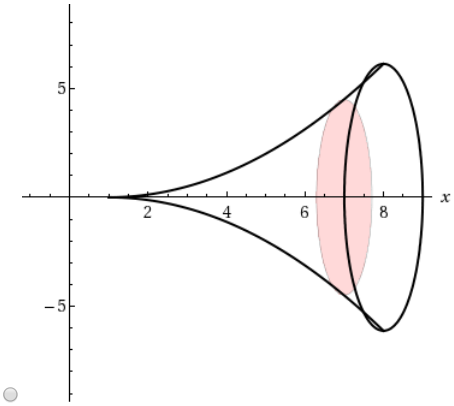


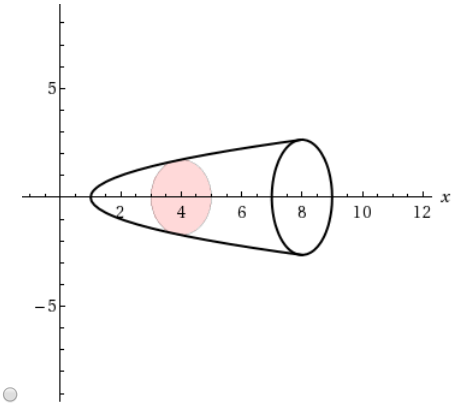


Sketch the solid, and a typical disk or washer.






5
−5
2
4
6
8
x


5
−5
2
4
6
8
10
12
x

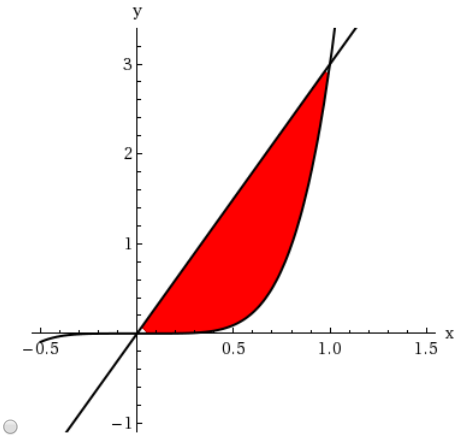
33. Question Details SCalcET8 6.2.007.MI. [3805197]

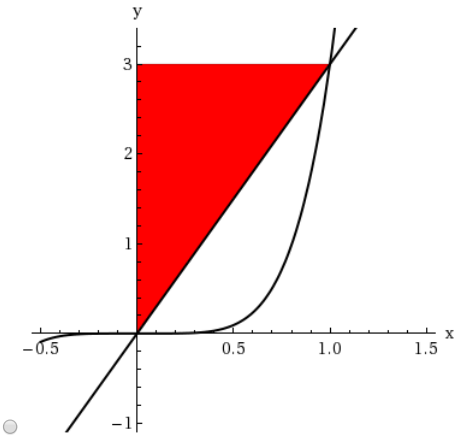
Find the volume V of the solid obtained by rotating the region bounded by the given curves about the specified line.

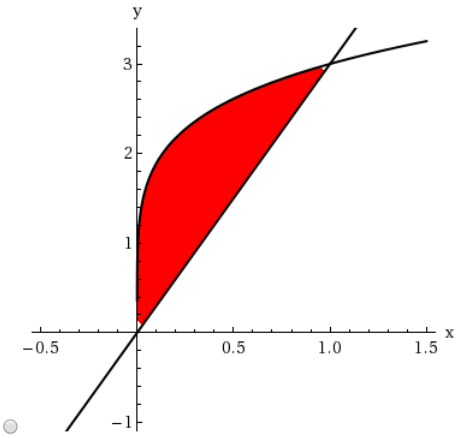
$y = 3x^5$, $y = 3x$, $x \geq 0$; about the x-axis

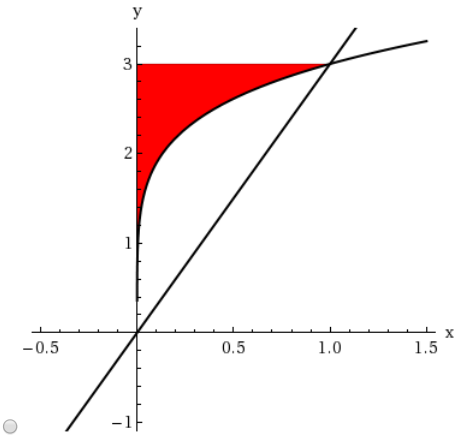
$V =$

Sketch the region.

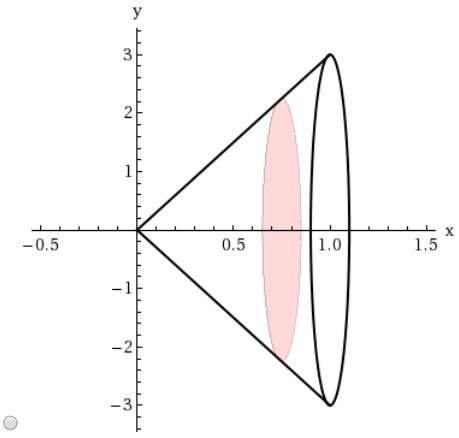


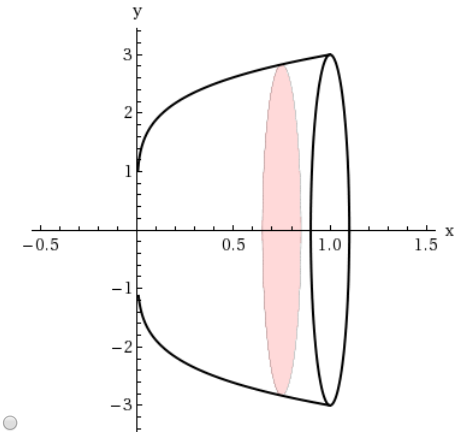


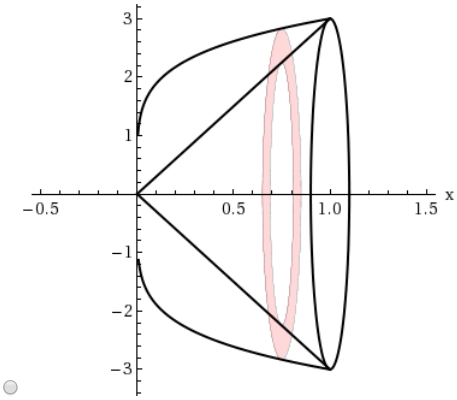


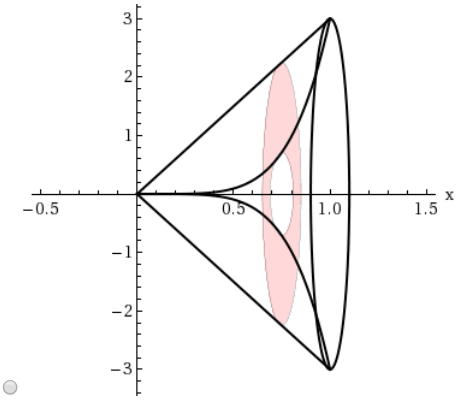


Sketch the solid, and a typical disk or washer.









34. Question Details SCalcET8 6.2.007.MI.SA. [3804874]

This question has several parts that must be completed sequentially. If you skip a part of the question, you will not receive any points for the skipped part, and you will not be able to come back to the skipped part.

Tutorial Exercise

Find the volume V of the solid obtained by rotating the region bounded by the given curves about the specified line.

$y = 6x^5$, $y = 6x$, $x \geq 0$; about the x-axis

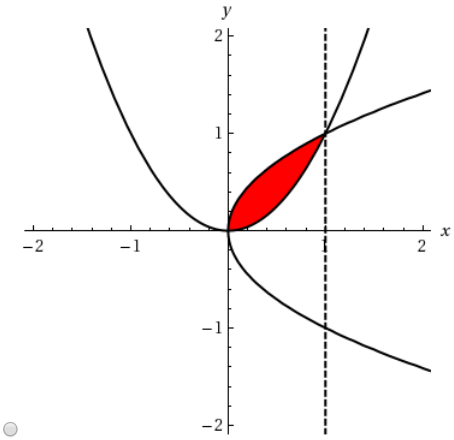
35. Question Details SCalcET8 6.2.011. [3805246]

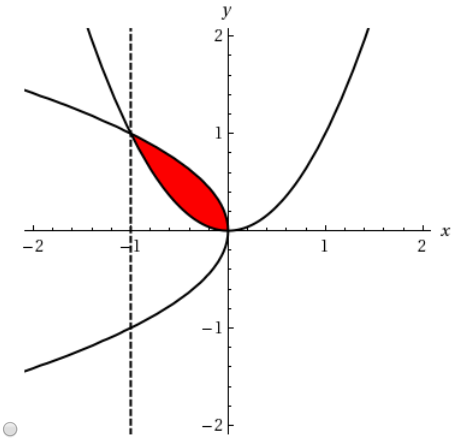
Find the volume V of the solid obtained by rotating the region bounded by the given curves about the specified line.

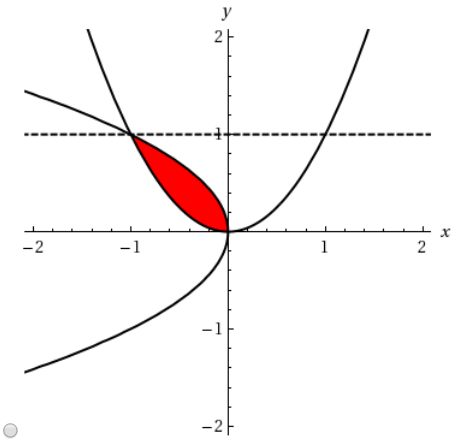
$y = x^2,\ x = y^2;$ about $y = 1$

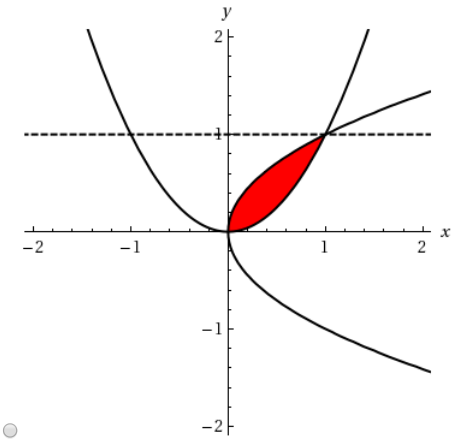
$V =$

Sketch the region.

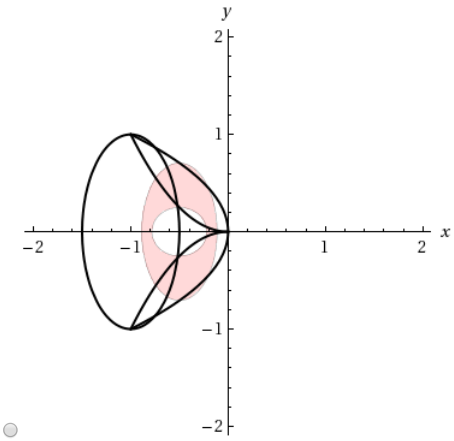


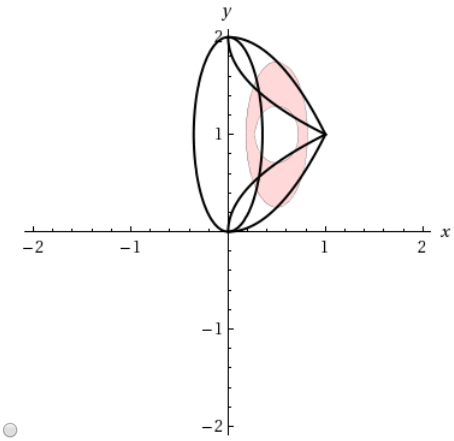


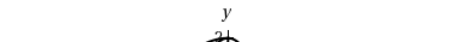


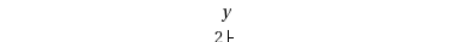


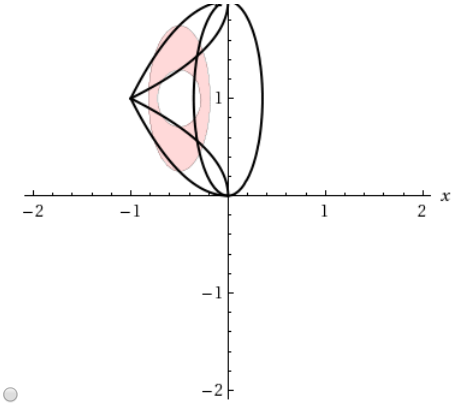
Sketch the solid, and a typical disk or washer.

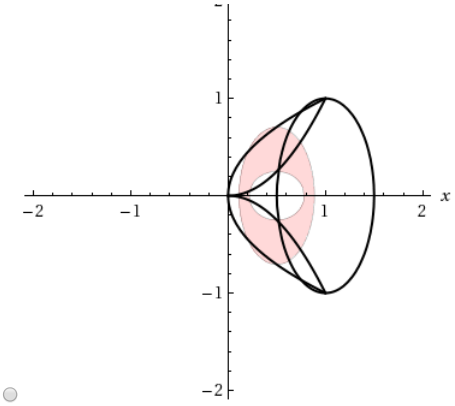








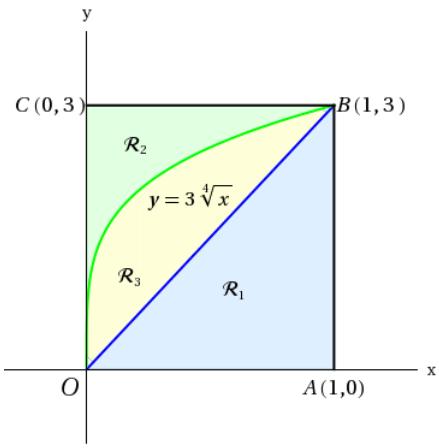




36. Question Details SCalcET8 6.2.019. [3804839]

Refer to the figure and find the volume generated by rotating the given region about the specified line.

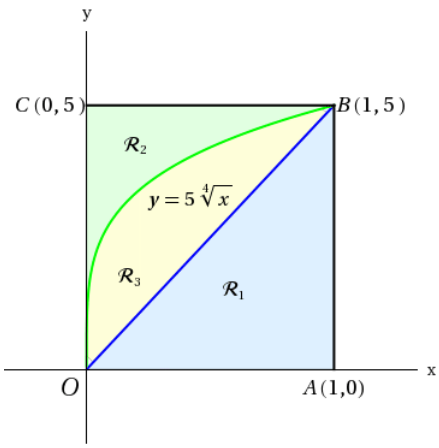
$\mathscr{R}_1$ about OA



37. Question Details SCalcET8 6.2.021. [3805019]

Refer to the figure and find the volume generated by rotating the given region about the specified line.

$\mathscr{R}_1$ about AB

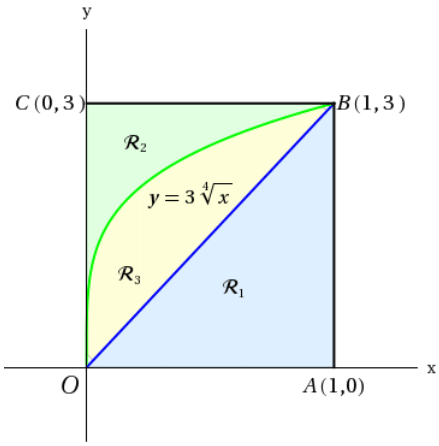


38. Question Details SCalcET8 6.2.028. [3805490]

Refer to the figure and find the volume V generated by rotating the given region about the specified line.

$\mathcal{R}_3$ about OC

$V =$

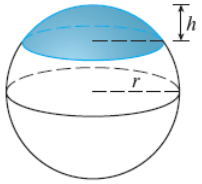


39. Question Details SCalcET8 6.2.049. [3804784]

Find the volume V of the described solid S.

A cap of a sphere with radius r and height h

$V =$



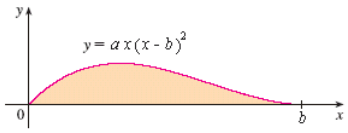
40. Question Details SCalcET8 6.2.070. [3805517]

A hole of radius r is bored through the center of a sphere of radius R. Find the volume V of the remaining portion of the sphere.

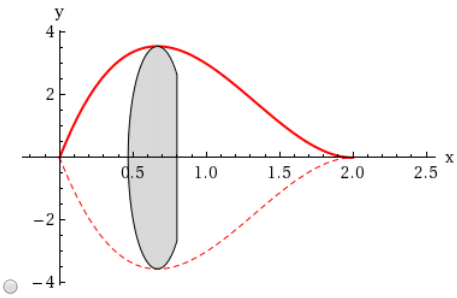
$V =$

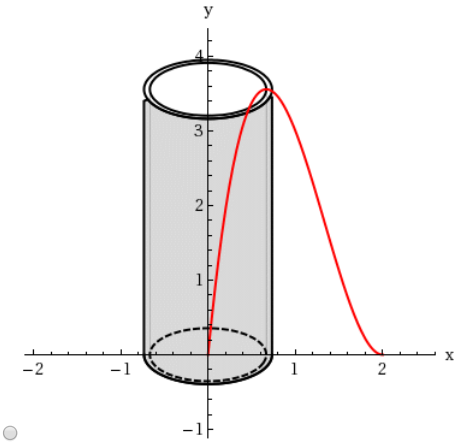
41. Question Details SCalcET8 6.3.001. [3804790]

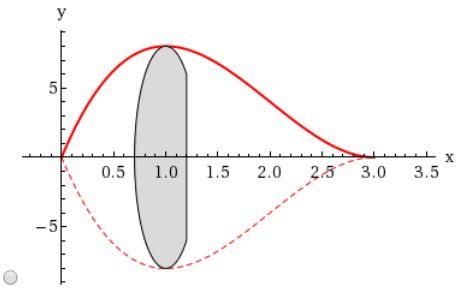
Let S be the solid obtained by rotating the region shown in the figure about the y-axis. (Assume $a = 3$ and $b = 2$.)

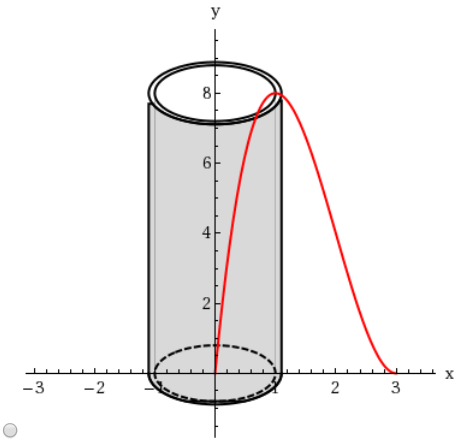


Sketch a typical approximating shell.









What are its circumference c and height h?

$c(x) =$

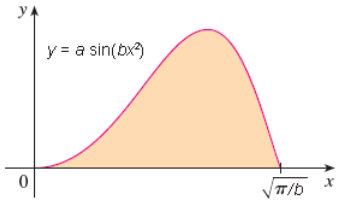
$h(x) =$

Use shells to find the volume V of S.

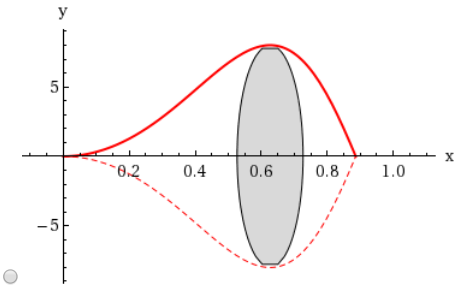
$V =$

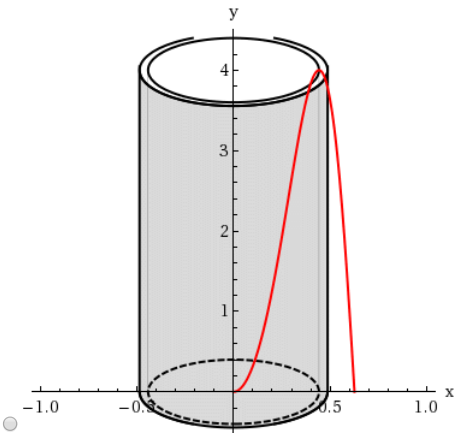
42. Question Details SCalcET8 6.3.002. [3804619]

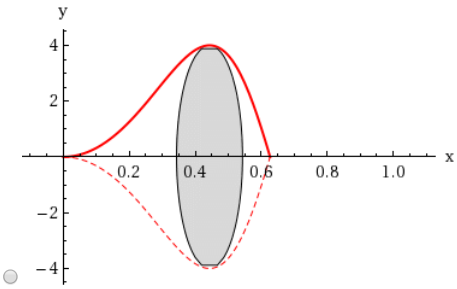
Let S be the solid obtained by rotating the region shown in the figure about the y-axis. (Assume $a = 8$ and $b = 4$.)

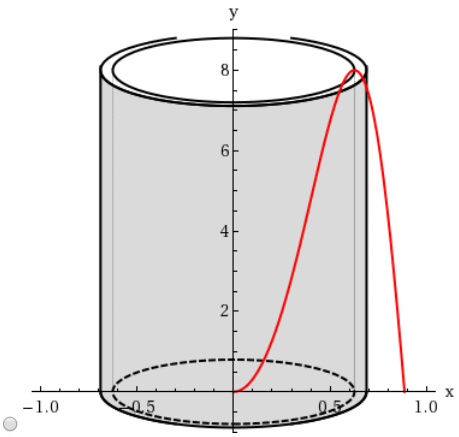


Sketch a typical approximating shell.









Find its circumference c and height h.

$c(x) =$

$h(x) =$

Use shells to find the volume V of S.

$V =$

43. Question Details SCalcET8 6.3.005.MI.SA. [3805431]

This question has several parts that must be completed sequentially. If you skip a part of the question, you will not receive any points for the skipped part, and you will not be able to come back to the skipped part.

Tutorial Exercise

Use the method of cylindrical shells to find the volume V generated by rotating the region bounded by the given curves about the y-axis.

$y = 6e^{-x^2}, \quad y = 0, \quad x = 0, \quad x = 1$

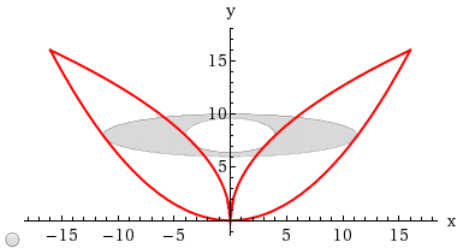
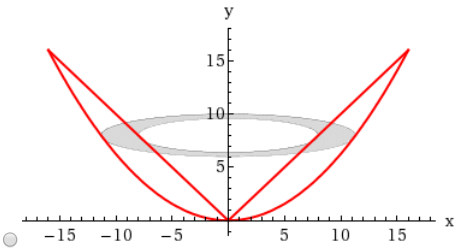
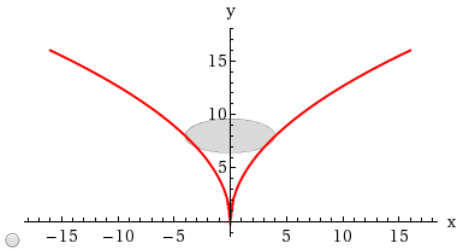
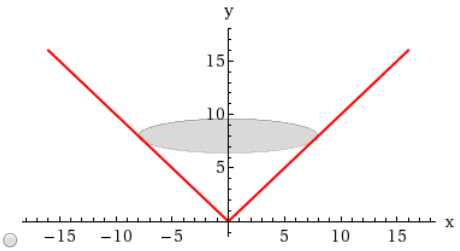
Sketch the region and a typical shell.

44. Question Details SCalcET8 6.3.008. [3848584]

Let V be the volume of the solid obtained by rotating about the y-axis the region bounded $y = \sqrt{16x}$ and $y = \frac{x^2}{16}$. Find V by slicing.

$V =$

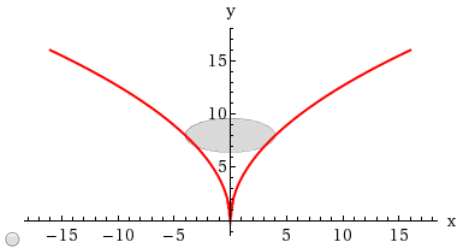
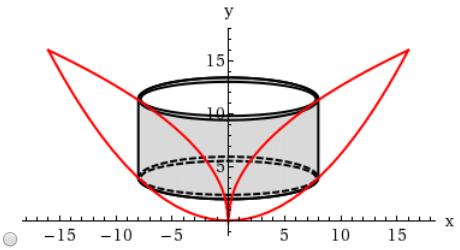
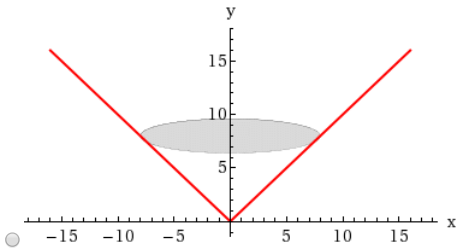
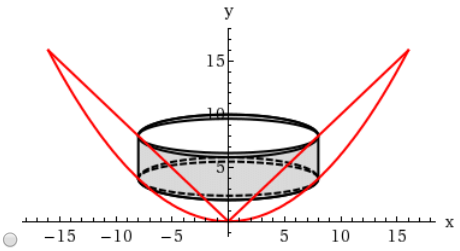
Draw a diagram to explain your method.

Find V by cylindrical shells.

$V =$

Draw a diagram to explain your method.

45. Question Details SCalcET8 6.3.015. [3805105]

Use the method of cylindrical shells to find the volume V generated by rotating the region bounded by the given curves about the specified axis.

$y = x^3$, $y = 8$, $x = 0$; about $x = 9$

$V =$

46. Question Details SCalcET8 6.3.037. [3875430]

The region bounded by the given curves is rotated about the specified axis. Find the volume V of the resulting solid by any method.

$y = -x^2 + 11x - 30$, $y = 0$; about the y−axis

$V =$

47. Question Details SCalcET8 6.3.041. [3805034]

The region bounded by the given curve is rotated about the specified axis. Find the volume V of the resulting solid by any method.

$x^2 + (y - 2)^2 = 4$; about the y-axis

$V =$

48. Question Details SCalcET8 6.3.045. [3804965]

Use cylindrical shells to find the volume V of the solid.

A sphere of radius r

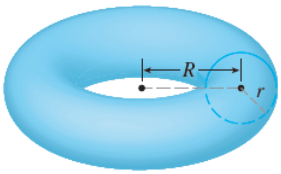
$V =$

49. Question Details SCalcET8 6.3.046. [3804622]

Use cylindrical shells to find the volume V of the solid.

The solid torus (the donut-shaped solid shown in the figure) with radii r and R

$V =$



Assignment Details

Name (AID): **Chap 6 HW -- Integration Application (11708641)**
Submissions Allowed: **15**
Category: **Homework**
Code:
Locked: **Yes**
Author: **Bird, Brian (** brian.bird@gccaz.edu **)**
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