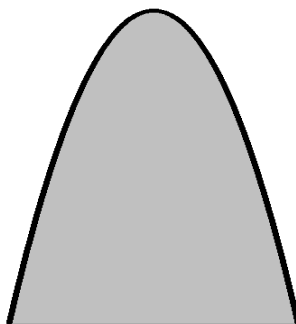
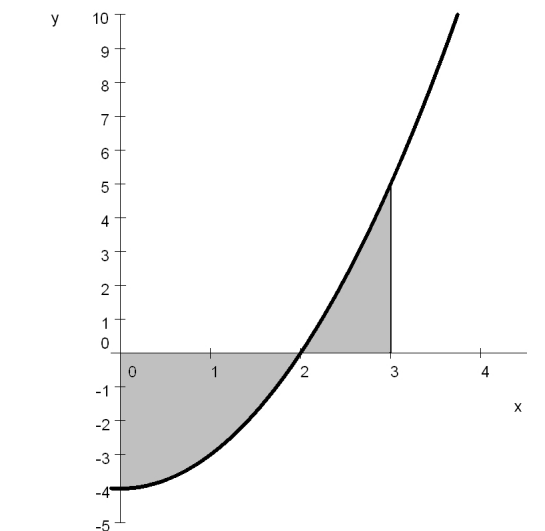


1. We need to build a door in the shape of a parabola. The door is to be of width of 6 feet and height of 9 feet. What is the surface area of this door?



2. Redo the previous problem, this time the door needs to be of width of 4 feet and height of 8 feet.
3. Find the shaded area shown on the picture below. The function graphed there is $f(x) = x^2 - 4$.



4. Find the area enclosed by the graphs of
 - a) $f(x) = x^2 + 1$ and $g(x) = 2x + 4$
 - b) $f(x) = -x^2 + 9$ and $g(x) = -2x + 1$
 - c) $f(x) = x^2 + 6x - 7$ and $g(x) = 5x + 5$
5. Find the area between the graphs of $x = y^2 - 2$ and $y = x$.
6. The velocity of an object is $v(t) = -2t + 5$.
 - a) How much does the object travel between $t = 0$ and $t = 2$?
 - b) How much does the object travel between $t = 2$ and $t = 4$?
7. Water is flowing into a tub at a rate of $3t^2 + 2t$ liters per minute.
 - a) How many liters enter the tub between $t = 0$ and $t = 2$ minutes?
 - b) How many liters enter the tub between $t = 8$ and $t = 10$ minutes?

8. In a certain town, the rate of deaths at time t due to a particular disease is modeled by $250e^{-2t}$ where $t \geq 0$. What is the total number of deaths from this disease predicted by the model?
9. Find the average value of each of the following functions on the interval indicated.
- a) $f(x) = x^2$ on $[0, 6]$ d) $f(x) = \frac{1}{x}$ on $[1, 10]$
- b) $f(x) = \sin x$ on $[0, \pi]$ e) $f(x) = e^{-2x}$ on $[0, 2]$
- c) $f(x) = 2^x$ on $[1, 4]$

Answers

- 1.) 36 2.) $\frac{64}{3} = 21\frac{1}{3}$ 3.) $\frac{23}{3}$ 4.) a) $\frac{32}{3}$ b) 36 c) $\frac{343}{6}$ 5.) $\frac{9}{2}$
- 6.) a) 6 b) 2.5 7.) a) 12 b) 524 8.) 125
- 9.) a) 12 b) $\frac{2}{\pi}$ c) $\frac{14}{3 \ln 2}$ d) $\frac{\ln 10}{9}$ e) $\frac{1}{4} - \frac{1}{4e^4}$