

3.1 Application and Extension

Find the domain of each function.

a.

$$v(t) = \frac{\sqrt{t+1}}{t-2}$$

RADICAND ≥ 0
 $t+1 \geq 0$
 $t \geq -1$

Denom $\neq 0$
 $t-2 \neq 0$
 $t \neq 2$

$D: t \geq -1, t \neq 2$

b.

$$a(x) = \frac{x-2}{2+\sqrt{x}}$$

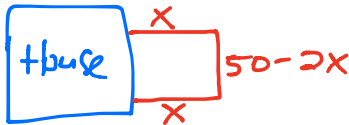
RADICAND ≥ 0
 $x \geq 0$

Denom $\neq 0$
 $2+\sqrt{x} \neq 0$
 $\sqrt{x} \neq -2$
no solution

$D: x \geq 0$

1. Mr. Kelly wants to create a rectangular feeding pen for his pigs, but only has 50 meters of fencing. He decides to use the side of his house as one side of the pen.

a. Draw a picture of this scenario and label the sides. Use x as the side of the pen that is perpendicular to his house.



b. Write an equation for the area A of the pen in terms of x .

$$A_{\square} = b \cdot h$$

$$A_{\square} = x(50 - 2x)$$

$$A_{\square} = 50x - 2x^2$$

c. What is the domain of the function A . (determined by the physical restrictions)?

$$D: 0 \leq x \leq 25$$

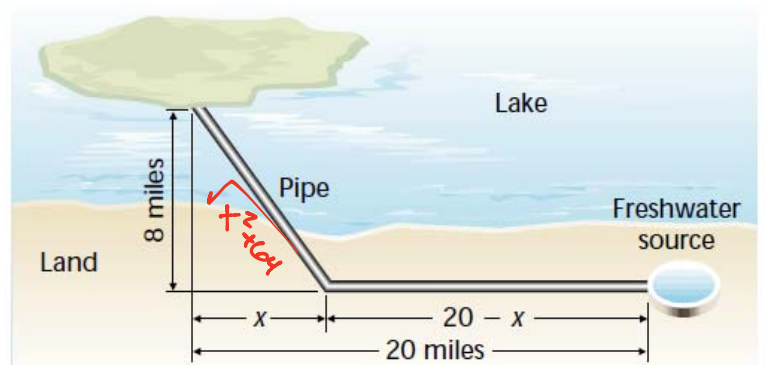
2. Mr. Brust has finally reached his dream in life and is going to live on a deserted island as a hermit and grow out a goatee. The problem is he needs to get freshwater out to the island from the mainland. The island is 8 miles offshore. It costs \$10,000 per mile to lay pipe on land and \$15,000 per mile to lay the pipe in the lake (see picture below).

a. Express the total cost C of constructing the pipeline as a function of x .

$$C = 10,000(20 - x) + 15,000\sqrt{x^2 + 64}$$

b. What is the domain of the function C ? (Hint: there are restrictions based on the possible values of x .)

$$0 \leq x \leq 20$$



$$\begin{aligned} x^2 + y^2 &= r^2 \\ x^2 + (8)^2 &= r^2 \\ x^2 + 64 &= r^2 \\ \pm\sqrt{x^2 + 64} &= r \end{aligned}$$