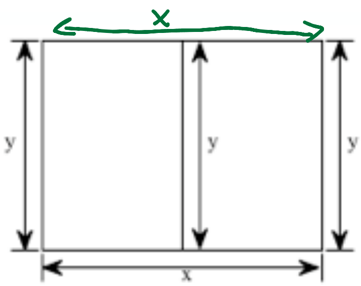
Period 4, Oct 29, 2024

You have 2000 feet of fencing to enclose a rectangular playground and subdivide it into two smaller playgrounds by placing the fencing parallel to one of the sides, as shown in the figure. Express the area of the playground, A, as a function of one of its dimensions, x.




$3y+2x=2000 \Rightarrow$ Solve For $y$

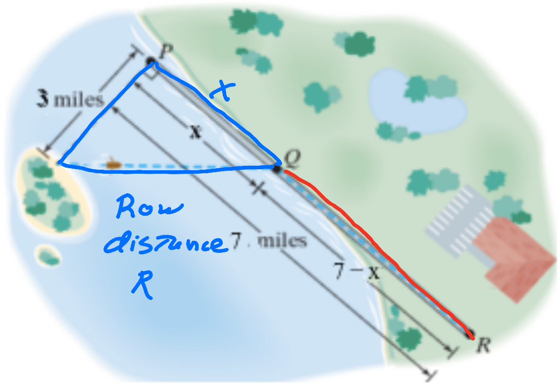
$\frac{\cancel{3}y}{\cancel{3}} = \frac{2000-2x}{3}$

$A = xy$

$y = \frac{2000-2x}{3}$

$A = x\left(\frac{2000-2x}{3}\right)$

You are on an island 3 miles from the nearest point P on a straight shoreline, as shown in the figure. 7 miles down the shoreline from point P is a restaurant, shown as point R. To reach the restaurant, you first row from the island to point Q, averaging 3 miles per hour. Then you jog the distance from Q to R, averaging 7 miles per hour. Express the time, T, it takes to go from the island to the restaurant as a function of the distance, x, from P, where you land the boat.




$$3^2 + x^2 = R^2$$

$$\pm\sqrt{9+x^2} = R$$

distance can't be negative

$$\sqrt{9+x^2} = R$$

Run distance $= 7 - x$

Run Rate $= 7$mph

$7 - x = 7 \cdot$ Time To Run

$\frac{7-x}{7}$ = Time To Run

Distance = Rate · Time

$\sqrt{9+x^2} = 3\text{mph} \cdot T$

$\frac{\sqrt{9+x^2}}{3} = T$ To Row

Total Time

$$\frac{\sqrt{9+x^2}}{3} + \frac{7-x}{7} = \text{Total Time}$$

Car Rental

\$27 To Rent, 5¢ per mile

y-int

Slope $= 0.05$

Total cost To Rent car

Total cost $= 0.05X + 27$

$X < 150$ Total cost $= 10$

Text Plan includes 150 texts cost \$10 per month

2¢ per text after 150 texts

150 is included

$X \geq 150$

Total cost of X # of Texts $= 10 + 0.02(x - 150)$

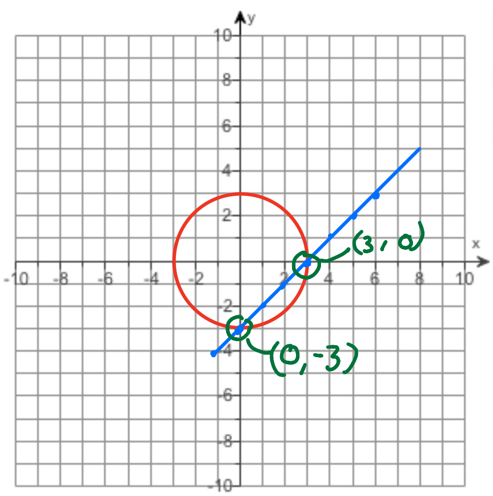
X<

Find the solution set for the given system by graphing both of the system's equations in the same rectangular coordinate system and finding all points of intersection.

$x^2 + y^2 = 9 \Rightarrow$ circle   radius $= \sqrt{9} = 3$   center $(0,0)$

$x - y = 3 \Rightarrow$ Line   slope $= 1$   $y$-int $= -3$

$x - 3 = y$




$x^2 + y^2 = 9$

$x - y = 3$

$(3,0)$   $3^2 + 0^2 = 9 + 0 = 9$

$3 - 0 = 3$   work

$(0,-3)$

$0^2 + (-3)^2 = 0 + 9 = 9$

$0 - (-3) = 0 + 3 = 3$   works

Given the function $f(x) = \sqrt{x-9}$, complete parts a through c.

**(a)** Find an equation for $f^{-1}(x)$.

**(b)** Graph f and $f^{-1}$ in the same rectangular coordinate system.

**(c)** Use interval notation to give the domain and the range of f and $f^{-1}$.

(Hint: To solve for a variable involving an nth root, raise both sides of the equation to the nth power, $\left(\sqrt[n]{y}\right)^n = y$.)

$Y = \sqrt{x-9}$ inverse $X^2 = \left(\sqrt{y-9}\right)^2$

$X^2 = Y - 9$
$+9 \quad +9$

$X^2 + 9 = Y$

$F^{-1}(x) = x^2 + 9$

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**a)** Find $f^{-1}(x)$. Select the correct choice below and fill in the answer box(es) to complete your choice.

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

- A. $f^{-1}(x) =$ ☐, for all x
- B. $f^{-1}(x) = x^2 + 9$, $x \geq 0$ ✓
- C. $f^{-1}(x) =$ ☐, $x \neq$ ☐
- D. $f^{-1}(x) =$ ☐, $x \leq$ ☐

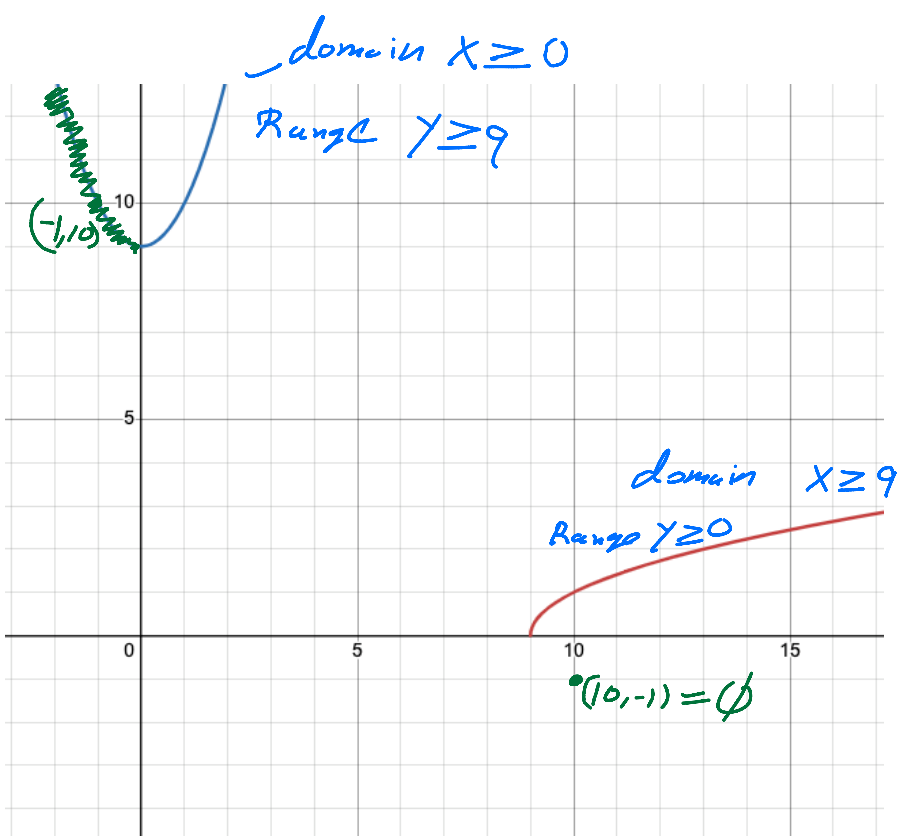
$y = \sqrt{x-9}$

$x \geq 9$

(9,0)
(10,1)
(13,2)
(18,3)

| X | Y |
|---|---|
| 9 | $0 = \sqrt{0}$ |
| 10 | $1 = \sqrt{1}$ |
| 13 | $2 = \sqrt{4}$ |
| 18 | $3 = \sqrt{9}$ |

$F^{-1}(x) = x^2 + 9$
(0,9)
(1,10)
(2,13)
(3,18)
$x \geq 0$



Given the function $f(x) = (x - 17)^2$, $x \le 17$ complete parts a through c.

**(a)** Find an equation for $f^{-1}(x)$.

**(b)** Graph f and $f^{-1}$ in the same rectangular coordinate system.

**(c)** Use interval notation to give the domain and the range of f and $f^{-1}$.

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**(a)** Find $f^{-1}(x)$.

$f^{-1}(x) = -\sqrt{x} + 17$

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

**(b)** Graph f and $f^{-1}$ in the same coordinate system. Choose the correct graph below.

$F(x) = (x-17)^2$ inverse $\Rightarrow$ $\sqrt{x} = \sqrt{(y-17)^2}$

$\pm\sqrt{x} = y - 17$

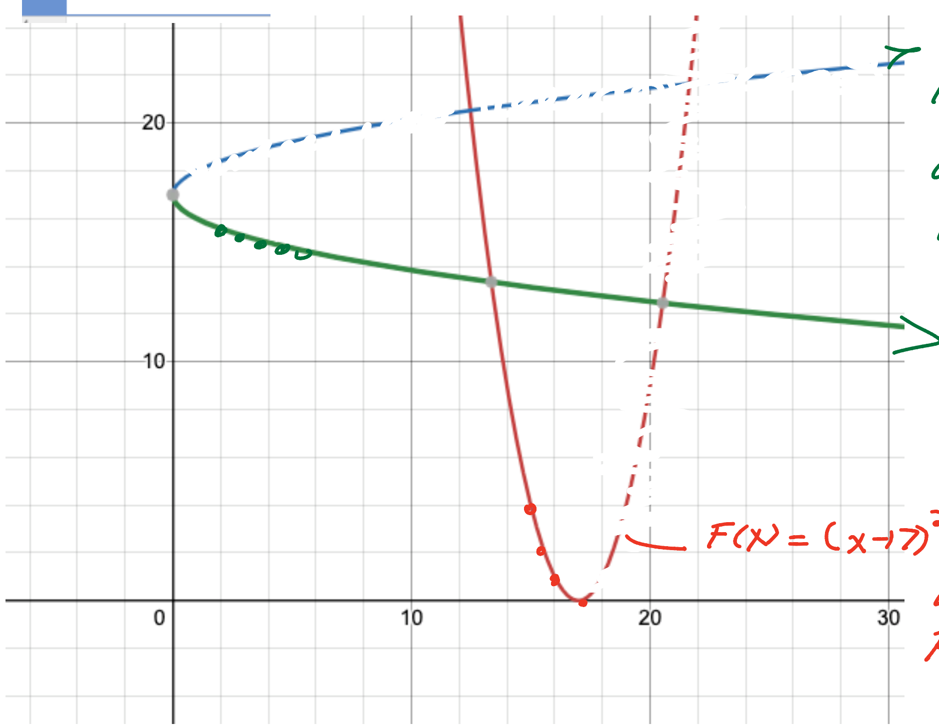
$+17 \quad +17$

$\pm\sqrt{x} + 17 = y \Rightarrow F^{-1}(x) = \pm\sqrt{x} + 17$

1 $y = (x-17)^2$

2 $y = \sqrt{x} + 17$

3 $y = -\sqrt{x} + 17$




$F^{-1}(x) = \pm\sqrt{x} + 17$

domain $x \ge 0$

Range $y = \mathbb{R}$

$y \le 17$

$F(x) = (x-17)^2$

domain $\mathbb{R}$

Range $y \ge 0$

$x \le 17$

Find f + g, f − g, fg, and $\frac{f}{g}$. Determine the domain for each function.

$f(x) = \sqrt{x}$; $g(x) = x - 9$ ← domain $= \mathbb{R} = (-\infty, \infty)$

domain $x \ge 0$

$(F+g)(x) = \overbrace{\sqrt{x}}^{x \ge 0} + \overbrace{x-9}^{\mathbb{R}}$ $\Rightarrow$ Domain $x \ge 0$ $\quad [0, \infty)$

$(F-g)(x) = \sqrt{x} - (x-9) = \sqrt{x} - x + 9 \Rightarrow$ Domain $x \ge 0$ $\quad [0, \infty)$

$(F \cdot g)(x) = \sqrt{x}(x-9) = x\sqrt{x} - 9\sqrt{x} \Rightarrow$ Domain $x \ge 0$ $\quad [0, \infty)$

$\left(\frac{F}{g}\right)(x) = \frac{\sqrt{x}}{x-9}$ Domain $x \ge 0$ and $x \ne 9$

$[0, 9) \cup (9, \infty)$

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Find the domain of the function.

$$f(x) = \frac{2x+9}{x^3 - x^2 - 9x + 9}$$

$x^3 - x^2 - 9x + 9$

$x^2(x-1) - 9(x-1)$

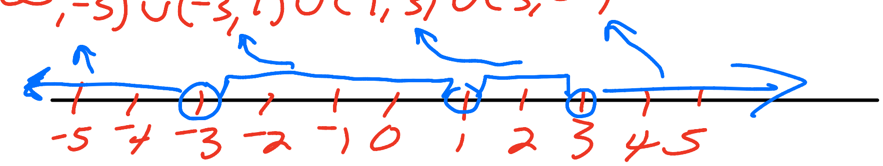
$(x-1)(x^2-9) = (x-1)(x^2-3^2)$

$= (x-1)(x-3)(x+3)$

$$F(x) = \frac{2x+9}{(x-1)(x-3)(x+3)}$$

domain $x = 1, 3, -3$

$(-\infty, -3) \cup (-3, 1) \cup (1, 3) \cup (3, \infty)$



Use the graphs of f and g to evaluate the composite function.

$(f \circ g)(-5)$

$F(g(-5)) = F(3) = 3$

$g(-5) = 3$