

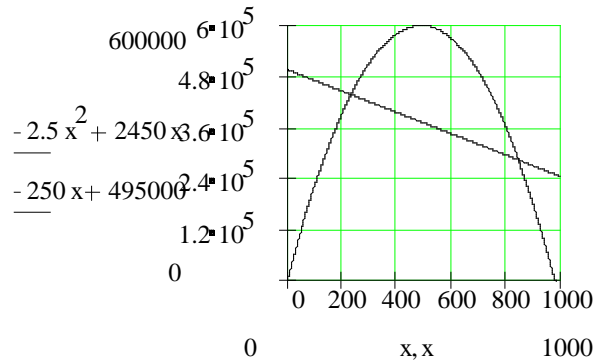
12.2 Solving Nonlinear Equations by Graphing

- 1)
- a) After 55 sec, the fireworks are coming into view. After 5.70 seconds the fireworks are going out of view.
 - b) At any time in this interval the fireworks have not yet risen above the balcony.
 - c) The partial solution set $\{t \mid 5.70 < t < 6.25\}$ indicates that Tashi and Tenzing have a poor view of the fireworks at any time between 5.70 and 6.25 sec after they have been fired. At any time t in this interval, the fireworks have fallen below the balcony.

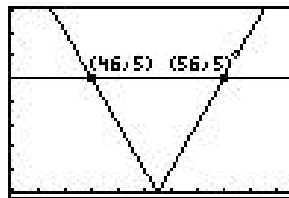
- 3) Acme will lose money if they sell their widgets for less than or equal to \$234 or greater than or equal to \$846.

a) $[0, 234] \quad [846, 980]$

b)



- 5) The part of the absolute value graph that is above the line $y = 5$ will determine our solution.



Hence, any percentage between 0 and 46 percent or between 56 and 100% is over this candidate's 5% margin of error.

a) $\{x : x < 46 \text{ or } x > 56\}$

b) $[0, 46) \cup (56, 100]$

7) The graph of \sqrt{x} is at or below 2 x values between 0 and 4 (inclusive).

Solution set: $\{x : 0 \leq x \leq 4\}$

The domain of this piece of the graph $y = \sqrt{x}$ is the set of all x values this piece of the graph assumes, and this set is our solution set.

9)

a) $\{x : -5 < x < -4\}$ $\leftarrow -5$ lies in this interval

Check:

$(-5) + 11 < -(-5) + 3$



\leftarrow True

b) $\{x : -4 \leq x < 0\}$ $\leftarrow 0$ lies in this interval

Check

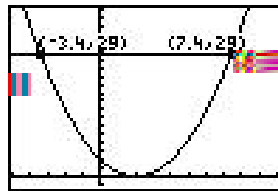
$0 + 11 \leq 0 + 3$

$11 \leq 3$

\leftarrow True

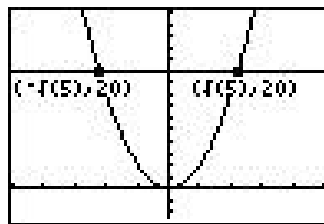
11) $\{x \mid x < -3.4 \text{ or } x > 7.4\}$ (approximately)

$(-\infty, -3.4) \cup (7.4, \infty)$ (approximately)



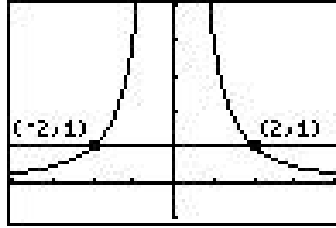
13) $\{x \mid x \leq -\sqrt{5} \text{ or } x \geq \sqrt{5}\}$

$(-\infty, -\sqrt{5}] \cup [\sqrt{5}, \infty)$



15) $\{x \mid x < -2 \text{ or } x > 2\}$

$(-\infty, -2) \cup (2, \infty)$



Skill and Review

17)

$$\begin{aligned}
 \text{a)} \quad f(g(x)) &= f(3x-1) \\
 &= (3x-1)^2 + 1 \\
 &= (9x^2 - 6x + 1) + 1 \\
 &= 9x^2 - 6x + 2
 \end{aligned}$$

$$\begin{aligned}
 \text{b)} \quad f(g(-2)) &= 9(-2)^2 - 6(-2) + 2 \\
 &= 9(4) + 12 + 2 \\
 &= 36 + 12 + 2 \\
 &= 50
 \end{aligned}$$

19) $(x-9)^{1/4} = 2$

$$\left[(x-9)^{1/4} \right]^4 = (2)^4$$

$$x-9 = 16$$

$$x = 25$$

← Taking the 4th power undoes the $\frac{1}{4}$ th power.