ANSWER PRESENTATION TOOL

1. C; The x-intercepts are $x = -1$ and $x = -3$. The test point $(-2, 5)$ does not satisfy the inequality.

3. B; The x-intercepts are $x = 1$ and $x = 3$. The test point $(2, 5)$ does not satisfy the inequality.

5. **Step 1** Graph $y = -x^2$. Because the inequality symbol is <, make the parabola dashed.

Step 2 Test a point inside the parabola, such as $(0, -1)$.

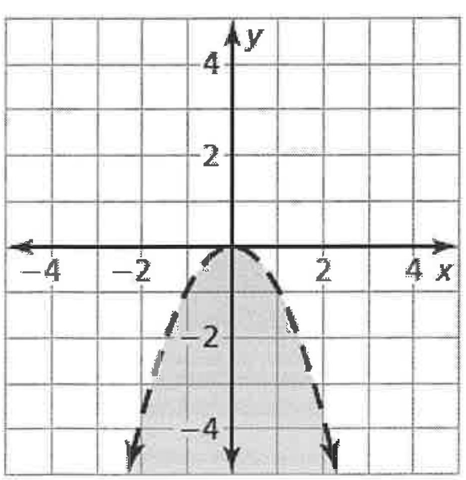
$$y < -x^2$$

$$-1 \overset{?}{<} -0^2$$

$$-1 < 0$$

So, $(0, -1)$ is a solution of the inequality.

Step 3 Shade the region inside the parabola.



7. Step 1 Graph $y = x^2 - 9$. Because the inequality symbol is $>$, make the parabola dashed.

Step 2 Test a point inside the parabola, such as (0, 1).

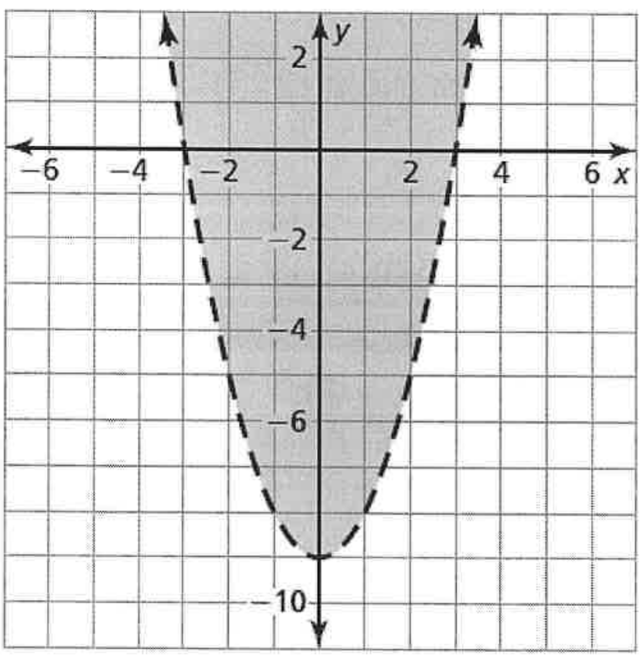
$y > x^2 - 9$

$1 \overset{?}{\geq} (0)^2 - 9$

$1 \geq -9$

So, (0, 1) is a solution of the inequality.

Step 3 Shade the region inside the parabola.



9. Step 1 Graph $y = x^2 + 5x$. Because the inequality symbol is $\leq$, make the parabola solid.

Step 2 Test a point outside the parabola, such as $(1, -1)$.

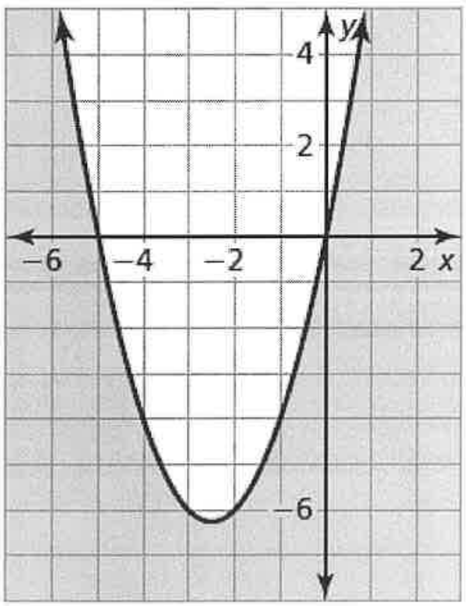
$$y \leq x^2 + 5x$$

$$-1 \overset{?}{\leq} (1)^2 + 5(1)$$

$$-1 \leq 6$$

So, $(1, -1)$ is a solution of the inequality.

Step 3 Shade the region outside the parabola.



11. Step 1 Graph $y = 2(x + 3)^2 - 1$. Because the inequality symbol is >, make the parabola dashed.

Step 2 Test a point inside the parabola, such as $(-3, 1)$.

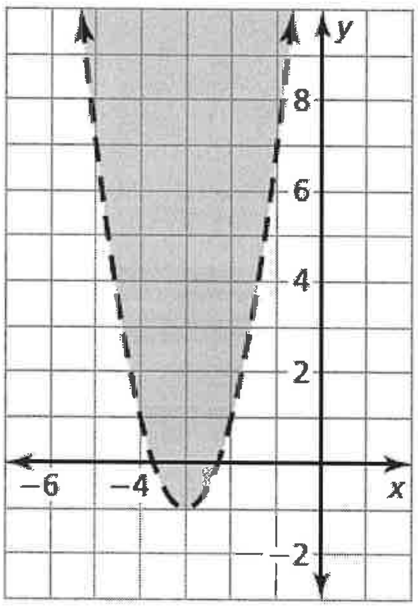
$y > 2(x + 3)^2 - 1$

$1 \overset{?}{>} 2(-3 + 3)^2 - 1$

$1 > -1$

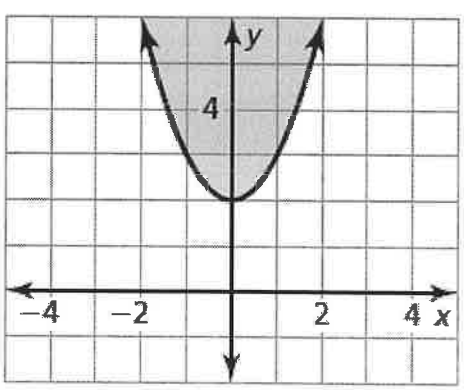
So, $(-3, 1)$ is a solution of the inequality.

Step 3 Shade the region inside the parabola.



13. Let $P = (x_1, y_1)$, then the inequality is $y_1 > f(x_1)$.

15. The graph should be solid, not dashed.



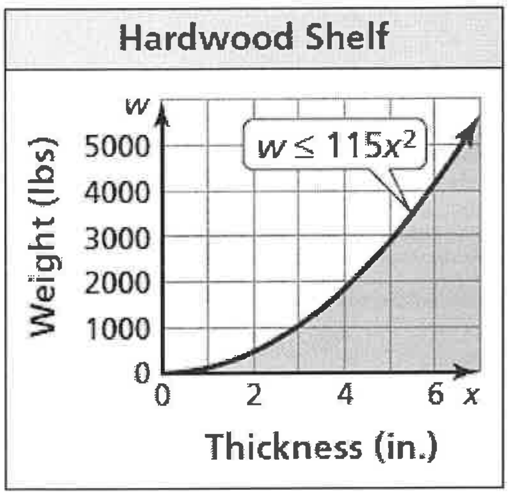
17. Graph $W = 115x^2$ for nonnegative values of x. Because the inequality symbol is $\leq$, make the parabola solid. Test a point outside the parabola, such as (1, 100).

$$W \leq 115x^2$$

$$100 \overset{?}{\leq} 115(1)^2$$

$$100 \leq 115$$

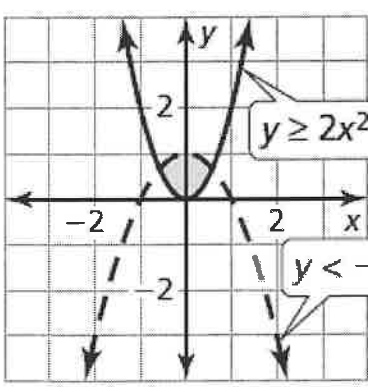
Because (1, 100) is a solution, shade the region outside the parabola. The shaded region represents weights that can be supported by shelves with various thicknesses.



19. Step 1 Graph $y \geq 2x^2$.

Step 2 Graph $y < -x^2 + 1$.

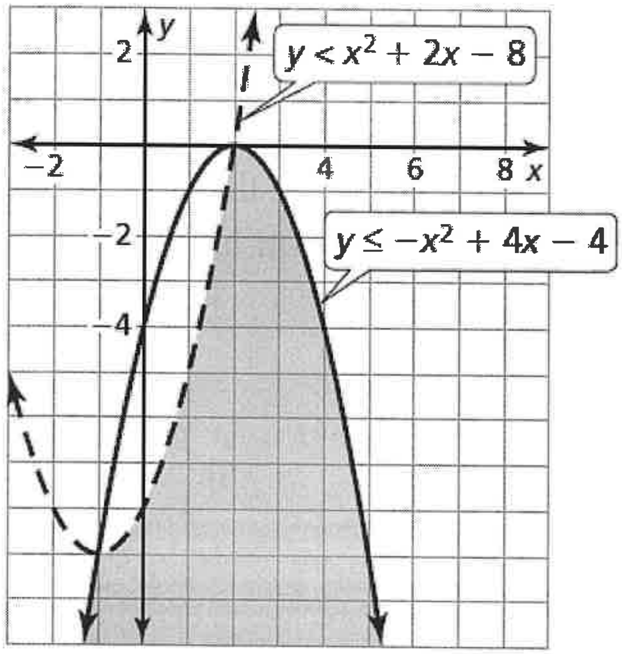
Step 3 Identify the region where the two graphs overlap. This region is the graph of the system.



21. Step 1 Graph $y \leq -x^2 + 4x - 4$.

Step 2 Graph $y < x^2 + 2x - 8$.

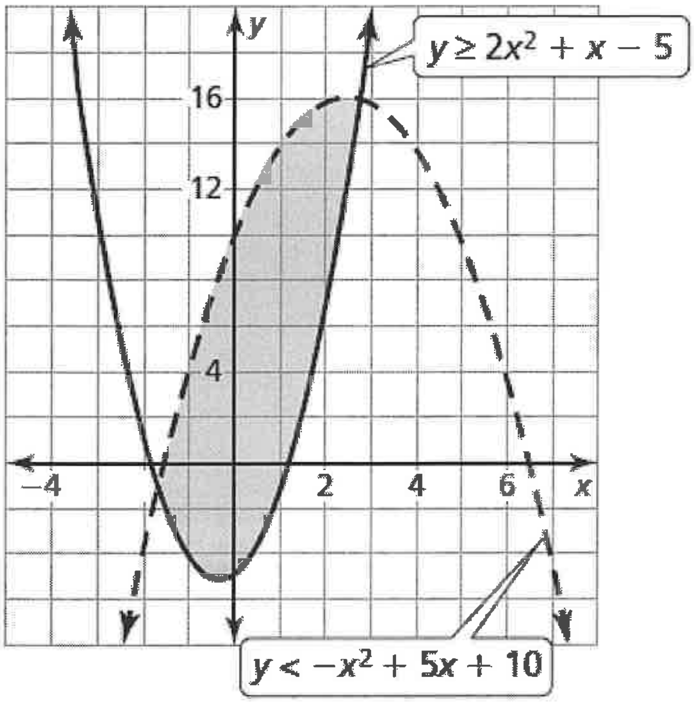
Step 3 Identify the region where the two graphs overlap. This region is the graph of the system.



23. Step 1 Graph $y \geq 2x^2 + x - 5$.

Step 2 Graph $y < -x^2 + x + 10$.

Step 3 Identify the region where the two graphs overlap. This region is the graph of the system.



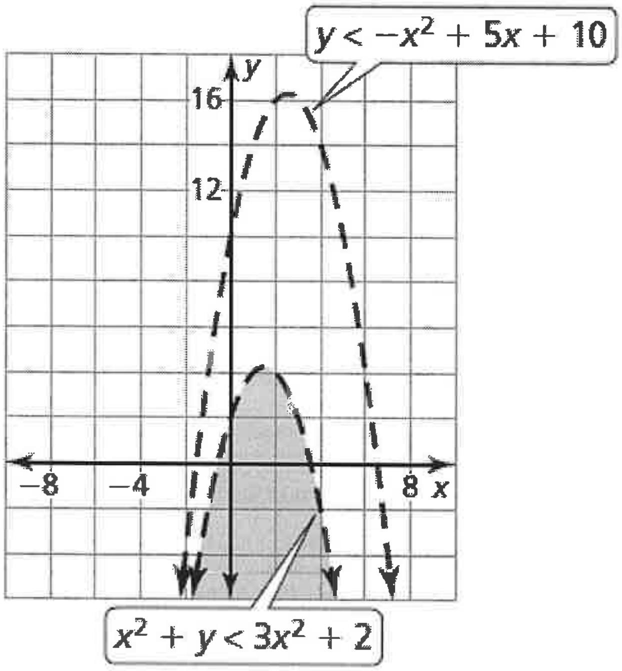
25. $x^2 + y < 3x + 2$

$y < -x^2 + 3x + 2$

Step 1 Graph $y < -x^2 + 3x + 2$.

Step 2 Graph $y < -x^2 + 5x + 10$.

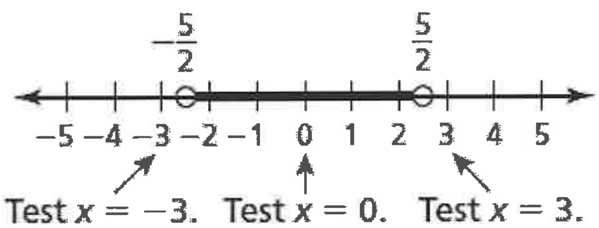
Step 3 Identify the region where the two graphs overlap. This region is the graph of the system.



27. First, write and solve the equation obtained by replacing < with =.

$$4x^2 = 25$$
$$x^2 = \frac{25}{4}$$
$$x = \frac{5}{2} \quad \text{or} \quad x = -\frac{5}{2}$$

The numbers $-\frac{5}{2}$ and $\frac{5}{2}$ are critical values of the original inequality. Plot $-\frac{5}{2}$ and $\frac{5}{2}$ on a number line, using open dots because the values do not satisfy the inequality. The critical x-values partition the number line into three intervals. Test an x-value in each interval to determine whether it satisfies the inequality.



$$4(-3)^2 \not< 25$$
$$4(0)^2 < 25 \checkmark$$
$$4(3)^2 \not< 25$$

So, the solution is $-\frac{5}{2} < x < \frac{5}{2}$.

29. First, write and solve the equation obtained by replacing $\geq$ with $=$.

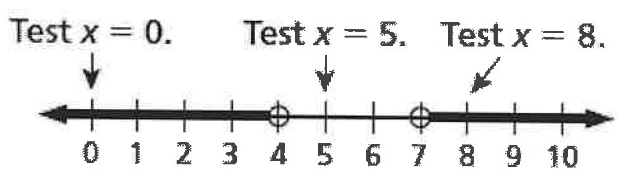
$$x^2 - 11x = -28$$

$$x^2 - 11x + 28 = 0$$

$$(x - 4)(x - 7) = 0$$

$$x = 4 \quad \text{or} \quad x = 7$$

The numbers 4 and 7 are critical values of the original inequality. Plot 4 and 7 on a number line, using closed dots because the values do satisfy the inequality. The critical x-values partition the number line into three intervals. Test an x-value in each interval to determine whether it satisfies the inequality.



$0^2 - 11(0) \geq -28$ ✓

$5^2 - 11(5) \not\geq -28$

$8^2 - 11(8) \geq -28$ ✓

So, the solution is $x \leq 4$ or $x \geq 7$.

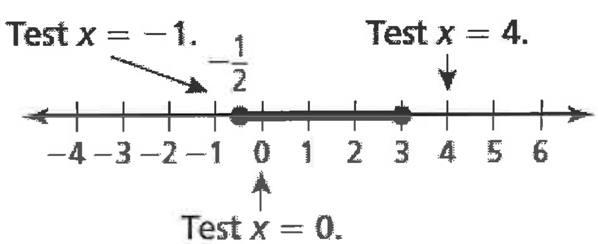
31. First, write and solve the equation obtained by replacing $\leq$ with $=$.

$$2x^2 - 5x - 3 = 0$$

$$(2x + 1)(x - 3) = 0$$

$$x = -\tfrac{1}{2} \quad \text{or} \quad x = 3$$

The numbers $-\frac{1}{2}$ and 3 are critical values of the original inequality. Plot $-\frac{1}{2}$ and 3 on a number line, using closed dots because the values do satisfy the inequality. The critical x-values partition the number line into three intervals. Test an x-value in each interval to determine whether it satisfies the inequality.



$$2(-1)^2 - 5(-1) - 3 \not\leq 0$$

$$2(0)^2 - 5(0) - 3 \leq 0 \checkmark$$

$$2(4)^2 - 5(4) - 3 \not\leq 0$$

So, the solution is $-\frac{1}{2} \leq x \leq 3$.

33. First, write and solve the equation obtained by replacing > with =.

$$\frac{1}{2}x^2 - x = 4$$

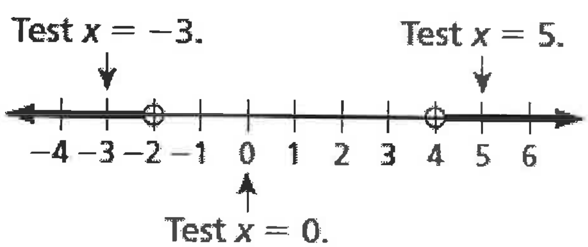
$$\frac{1}{2}x^2 - x - 4 = 0$$

$$x^2 - 2x - 8 = 0$$

$$(x - 4)(x + 2) = 0$$

$$x = 4 \quad \text{or} \quad x = -2$$

The numbers -2 and 4 are critical values of the original inequality. Plot -2 and 4 on a number line, using open dots because the values do not satisfy the inequality. The critical x-values partition the number line into three intervals. Test an x-value in each interval to determine whether it satisfies the inequality.



$$\frac{1}{2}(-3)^2 - (-3) > 4 \checkmark$$

$$\frac{1}{2}(0)^2 - 0 \not> 4$$

$$\frac{1}{2}(5)^2 - 5 > 4 \checkmark$$

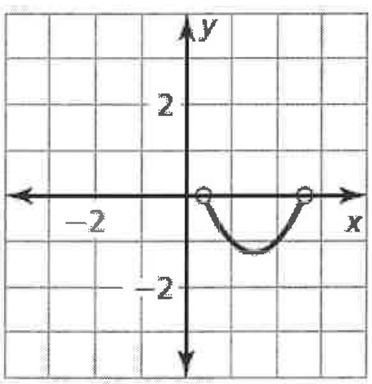
So, the solution is $x < -2$ or $x > 4$.

35. The solution consists of the x-values for which the graph of $y = x^2 - 3x + 1$ lies below the x-axis. Find the x-intercepts of the graph by letting $y = 0$ and use the Quadratic Formula to solve $0 = x^2 - 3x + 1$ for x.

$$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(1)(1)}}{2(1)}$$

$$x = \frac{3 \pm \sqrt{5}}{2}$$

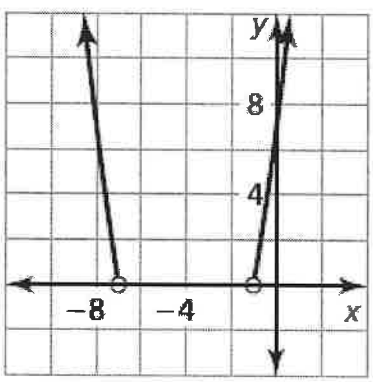
The solutions are $x \approx 0.38$ and $x \approx 2.62$. Sketch a parabola that opens up and has 0.38 and 2.62 as x-intercepts. The graph lies below the x-axis to the right of $x = 0.38$ and to the left of $x = 2.62$. The solution of the inequality is approximately $0.38 < x < 2.62$.



37. The solution consists of the x-values for which the graph of $y = x^2 + 8x + 7$ lies above the x-axis. Find the x-intercepts of the graph by letting $y = 0$ and use factoring to solve $0 = x^2 + 8x + 7$ for x.

$$x^2 + 8x + 7 = 0$$
$$(x + 7)(x + 1) = 0$$
$$x + 7 = 0 \quad \text{or} \quad x + 1 = 0$$
$$x = -7 \quad \text{or} \quad x = -1$$

The solutions are $x = -7$ and $x = -1$. Sketch a parabola that opens up and has -7 and -1 as x-intercepts. The graph lies above the x-axis to the left of $x = -7$ and to the right of $x = -1$. The solution of the inequality is $x < -7$ or $x > -1$.



39. The solution consists of the x-values for which the graph of $y = 3x^2 + 2x - 8$ lies on or below the x-axis. Find the x-intercepts of the graph by letting $y = 0$ and use factoring to solve $0 = 3x^2 + 2x - 8$ for x.

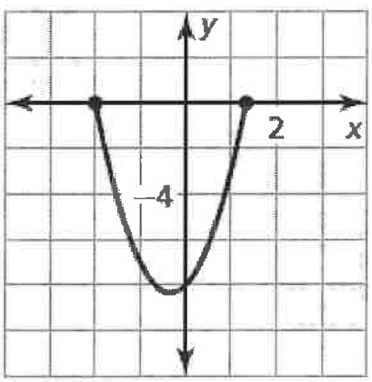
$$3x^2 + 2x - 8 = 0$$

$$(3x - 4)(x + 2) = 0$$

$$3x - 4 = 0 \quad \text{or} \quad x + 2 = 0$$

$$x = \tfrac{4}{3} \quad \text{or} \quad x = -2$$

The solutions are $x = -2$ and $x = \frac{4}{3}$. Sketch a parabola that opens up and has -2 and $\frac{4}{3}$ as x-intercepts. The graph lies on or below the x-axis to the right of $x = -2$ and to the left of $x = \frac{4}{3}$. The solution of the inequality is $-2 \le x \le \frac{4}{3}$.



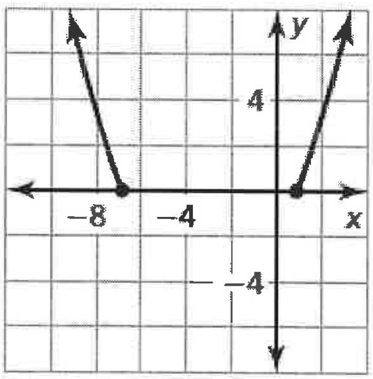
41. The solution consists of the x-values for which the graph of $y = \frac{1}{3}x^2 + 2x - 2$ lies on or above the x-axis. Find the x-intercepts of the graph by letting $y = 0$ and use the Quadratic Formula to solve $0 = \frac{1}{3}x^2 + 2x - 2$ for x.

$$x = \frac{-2 \pm \sqrt{2^2 - 4\left(\frac{1}{3}\right)(-2)}}{2\left(\frac{1}{3}\right)}$$

$$x = \frac{-2 \pm \sqrt{\frac{20}{3}}}{\frac{2}{3}}$$

$$x = -3 \pm \sqrt{15}$$

The solutions are $x \approx -6.87$ and $x \approx 0.87$. Sketch a parabola that opens up and has -6.87 and 0.87 as x-intercepts. The graph lies above the x-axis to the left of $x = -6.87$ and to the right of $x = 0.87$. The solution of the inequality is approximately $x \leq -6.87$ or $x \geq 0.87$.



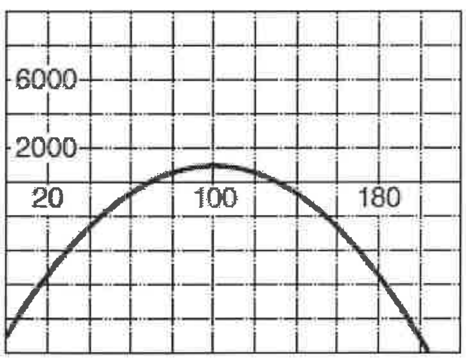
43. Let ℓ represent the length (in feet) and w represent the width (in feet) of the parking lot.

Perimeter = 400	Area $\geq$ 9100
$2\ell + 2w = 400$	$\ell w \geq 9100$

Solve the perimeter equation for w to obtain $w = 200 - \ell$. Substitute this into the area inequality to obtain a quadratic inequality in one variable.

$$\ell w \geq 9100$$
$$\ell(200 - \ell) \geq 9100$$
$$200\ell - \ell^2 \geq 9100$$
$$-\ell^2 + 200\ell - 9100 \geq 0$$

Use a graphing calculator to find the ℓ-intercept of $y = -\ell^2 + 200\ell - 9100$.



The ℓ-intercepts are $\ell = 70$ and $\ell = 130$. The solution consists of the ℓ-values for which the graph lies on or above the ℓ-axis. The graph lies on or above the ℓ-axis when $70 \leq \ell \leq 130$. So, the length of the parking lot is at least 70 feet and at most 130 feet.