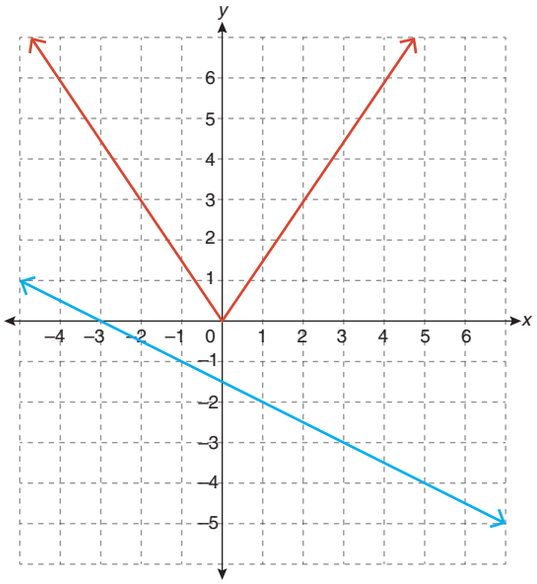
Lesson 6.2: Solving Absolute Value Equations

Practice Solutions – III

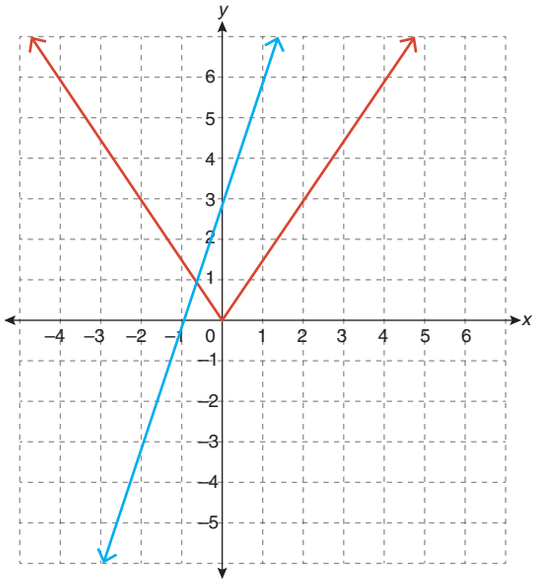
1. Sketch a graph of two functions that could be used to solve an absolute value equation with

Sketches will vary. Samples are shown.

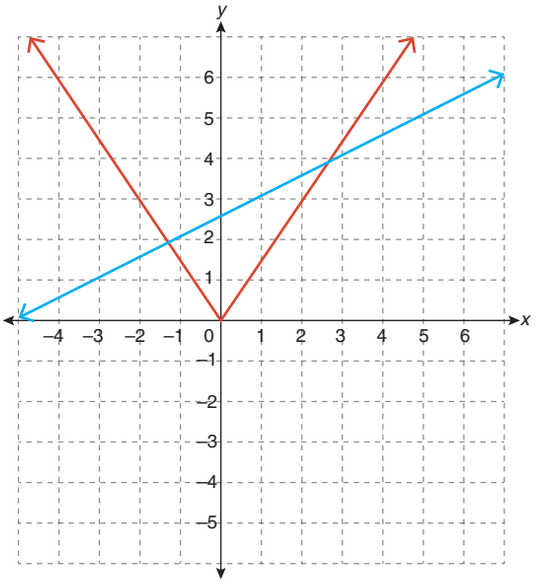
a. no solution



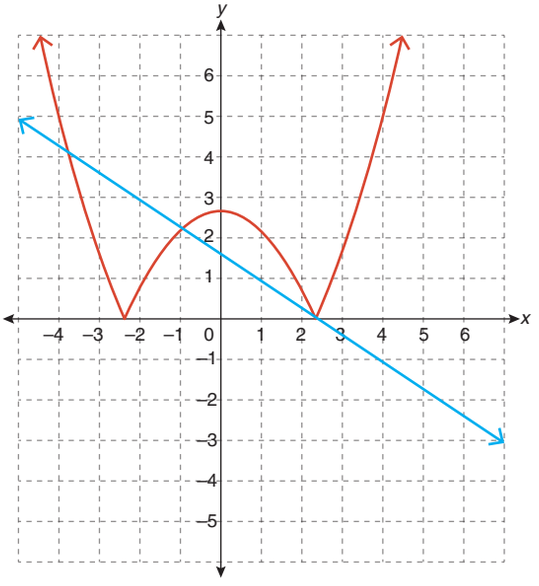
b. one solution



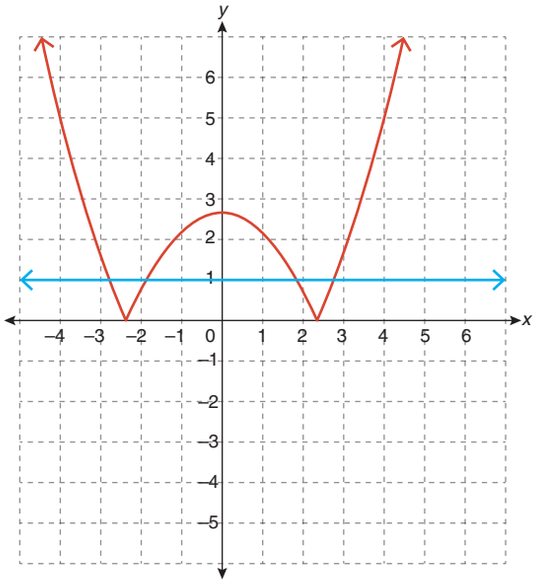
c. two solutions



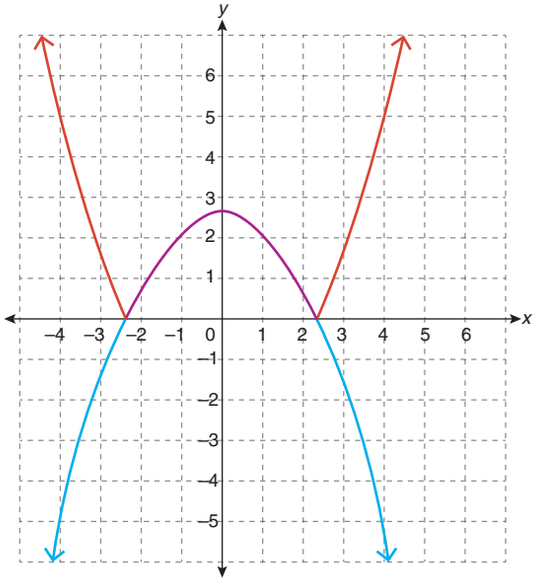
d. three solutions



e. four solutions

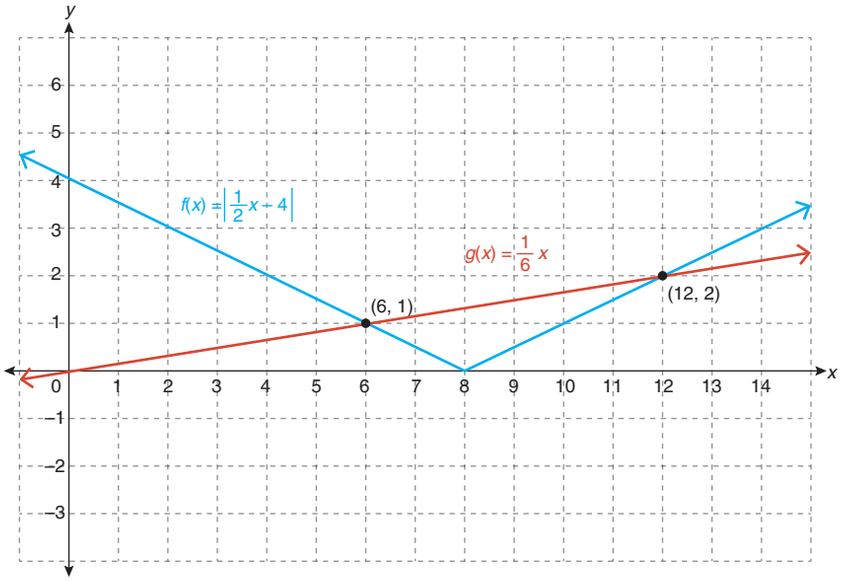


f. an infinite number of solutions



2. Solve each of the following equations graphically. Verify the solutions by substitution.

   a. $\left|\frac{1}{2}x - 4\right| = \frac{1}{6}x$



Verification:
Verify for $x = 6$.

Left Side	Right Side
$\left\|\frac{1}{2}x - 4\right\|$	$\frac{1}{6}x$
$\left\|\frac{1}{2}(6) - 4\right\|$	$\frac{1}{6}(6)$
$\|-1\|$	1
1	
LS = RS	

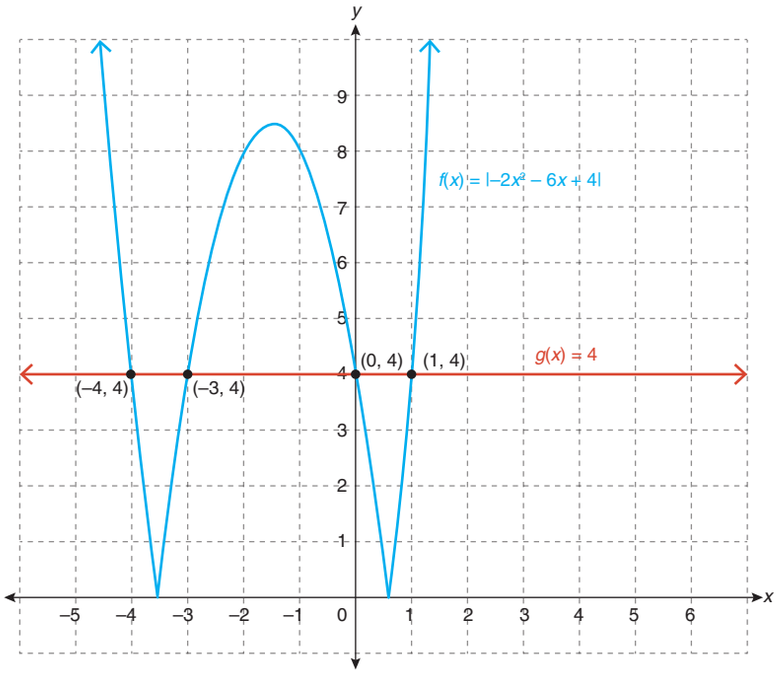
Therefore, $x = 6$ is a solution.

Verify for $x = 12$.

Left Side	Right Side
$\left\|\frac{1}{2}x - 4\right\|$	$\frac{1}{6}x$
$\left\|\frac{1}{2}(12) - 4\right\|$	$\frac{1}{6}(12)$
$\|2\|$	2
2	
LS = RS	

Therefore, $x = 12$ is a solution.

b. $|-2x^2-6x+4|=4$



Verification:

Verify for $x=-4$.

Left Side	Right Side
$\lvert-2x^2-6x+4\rvert$	4
$\lvert-2(-4)^2-6(-4)+4\rvert$	
$\lvert-4\rvert$	
4	
LS = RS	

Therefore, $x=-4$ is a solution.

Verify for $x=-3$.

Left Side	Right Side
$\lvert-2x^2-6x+4\rvert$	4
$\lvert-2(-3)^2-6(-3)+4\rvert$	
$\lvert4\rvert$	
4	
LS = RS	

Therefore, $x=-3$ is a solution.

Verification:

Verify for $x=0$.

Left Side	Right Side
$\lvert-2x^2-6x+4\rvert$	4
$\lvert-2(0)^2-6(0)+4\rvert$	
$\lvert4\rvert$	
4	
LS = RS	

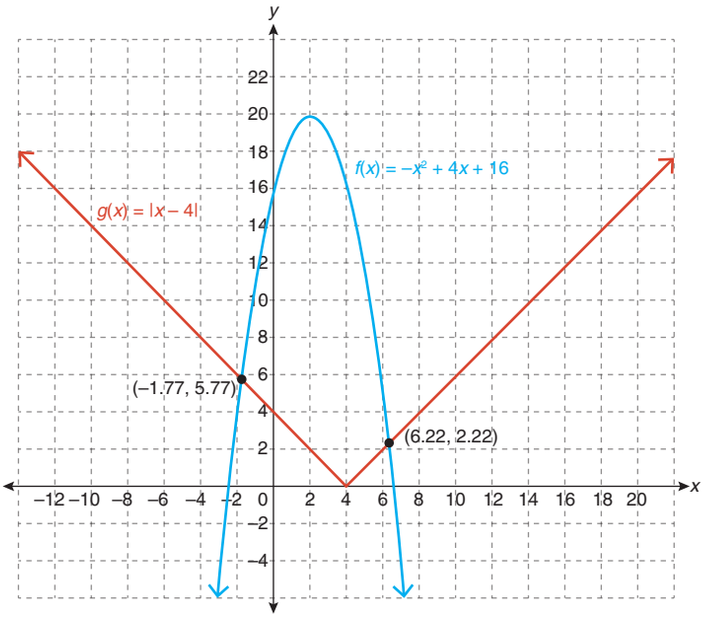
Therefore, $x=0$ is a solution.

Verify for $x=1$.

Left Side	Right Side
$\lvert-2x^2-6x+4\rvert$	4
$\lvert-2(1)^2-6(1)+4\rvert$	
$\lvert-4\rvert$	
4	
LS = RS	

Therefore, $x=1$ is a solution.

c. $-x^2 + 4x + 16 = |x - 4|$



Verification:
Verify for $x \doteq -1.77$.

Left Side	Right Side
$-x^2 + 4x + 16$	$\lvert x - 4 \rvert$
$-(-1.77)^2 + 4(-1.77) + 16$	$\lvert -1.77 - 4 \rvert$
5.7871	$\lvert -5.77 \rvert$
	5.77
LS $\doteq$ RS	

Therefore, $x \doteq -1.77$ is a solution.

Verify for $x \doteq 6.22$.

Left Side	Right Side
$-x^2 + 4x + 16$	$\lvert x - 4 \rvert$
$-(6.22)^2 + 4(6.22) + 16$	$\lvert 6.22 - 4 \rvert$
2.1916	$\lvert 2.22 \rvert$
	2.22
LS $\doteq$ RS	

Therefore, $x \doteq 6.22$ is a solution.