Section 2.6: Absolute Value Equations

Friday, October 11, 2013
9:43 AM

note: we are omitting absolute value inequalities

examples:

solve: $|x| = 7$

$x = -7$ or 7 $\{\pm 7\}$

———

$|x| = 0$

$x = 0$ $\{0\}$

———

$|x| = -7$ $\emptyset$

examples: Solve

$$|x + 3| = 8$$

$x + 3 = 8$ or $x + 3 = -8$
$x = 5$ $x = -11$

$x = -11, 5$ or $\{-11, 5\}$

$$2|y-3| - 11 = -1$$

$$2|y-3| = 10$$

$$|y-3| = 5$$

$$\swarrow \qquad \searrow$$

$$y - 3 = 5 \qquad or \qquad y - 3 = -5$$

$$y = 8 \qquad\qquad y = -2$$

$$\{-2, 8\}$$

$$|7(x-6)| + 3 = 0$$

$$|7(x-6)| = -3$$

$$\emptyset$$

$$|2x + 5| = 0$$

$$2x + 5 = 0$$

$$2x = -5$$

$$x = \frac{-5}{2}$$

$$\left\{-\frac{5}{2}\right\}$$

$$3 - \frac{1}{2}\left|\frac{1}{2}x - 4\right| = 2$$

$$(-2)\left[-\frac{1}{2}\left|\frac{1}{2}x - 4\right|\right] = -1 \, (-2)$$

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

↙   ↘

$$\frac{1}{2}x - 4 = 2 \qquad or \qquad \frac{1}{2}x - 4 = -2$$

$$\frac{1}{2}x = 6 \qquad\qquad\qquad \frac{1}{2}x = 2$$

$$x = 12 \qquad\qquad\qquad\qquad x = 4$$

$$\{4, 12\}$$

─────────

$$|4x - 1| = |x + 8|$$

↙   ↗

$$4x - 1 = x + 8 \qquad or \qquad 4x - 1 = -(x+8)$$

$$\qquad\qquad\qquad\qquad\qquad\qquad 4x - 1 = -x - 8$$

$$3x = 9 \qquad\qquad\qquad\qquad 5x = -7$$

$$x = 3 \qquad\qquad\qquad\qquad x = \frac{-7}{5}$$

$$\left\{\frac{-7}{5}, 3\right\}$$

$$|0.3x + 5| = |2 - 0.2x|$$

$0.3x + 5 = 2 - 0.2x$ or $0.3x + 5 = -(2 - 0.2x)$

$0.5x = -3$ ⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀$0.3x + 5 = -2 + 0.2x$

$x = -6$ ⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀$0.1x = -7$

⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀$x = -70$

⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀$\{-6, -70\}$