MATH 1010 ~ Intermediate Algebra   Chapter 2: Linear Equations and Inequalities

Section 2.1: Linear Equations

Objectives:

   ❋ Check solutions of linear equations.
   ❋ Solve linear equations in standard and nonstandard form.

$$3(x-2)-2x+1 = 4-(2x-5)$$

Some vocabulary:

Expression : fragment of a sentence; collection of numerical, algebraic terms

ex $3x + 7$ simplify

Equation: two expressions set equal to each other

$3x + 7 = 2x - 1$ solve

Solution set   for an eqn   is the value(s) of the variable that make the eqn true

Conditional Equation

types of eqns

an eqn that has finite # of solutions (one)

soln if only one variable

Identity

an eqn that's true for all values of the variable

ex $3x - 1 = 3x - 1$

A <u>linear equation</u> is an equation in one variable which can be
written as   <u>ax+b=0.</u> (standard form)
a, b are real numbers and a≠0

collection of only some x terms and constants
↑ any variable

① EXAMPLE:
Which of these are linear equations?   Solve if possible.   Check your answer.

a) $2x - 8 = 0$
+8 linear +8

$$\frac{2x}{2} = \frac{8}{2}$$

$$\boxed{x = 4}$$

check: $2(4) - 8 \overset{?}{=} 0$
✔

b) $3x^3 - x = 5x + 7$
non linear

Strategy for Solving Linear Eqn
① *Simplify both sides*
② *Add/subtract to isolate variable on one side*
③ *Multiply/divide to finish getting variable alone*

c) $3x + 2 + 2(x-6) = 5(x-2)$
linear

$3x + 2 + 2x - 12 = 5x - 10$

✶ $5x - 10 = 5x - 10$
+10   +10

✶ $5x = 5x$
-5x   -5x

✶ $0 = 0$
identity

soln set $x \in \mathbb{R}$

element of   *real #'s*

d) $2x + 8 = 3x + 4 - x$
linear

$2x + 8 = 2x + 4$
-2x   -2x

$8 = 4$

⇒ *no solution*
N.S.

② EXAMPLE

Solve and check your solution

a) $-2(x+3) = 9 - 5x$

$$-2x-6 = 9-5x$$
$$+5x+6 \quad +6+5x$$
$$\frac{3x}{3} = \frac{15}{3}$$
$$x = 5$$

check:

$$-2(5+3) \overset{?}{=} 9-5(5)$$
$$-2(8) \overset{?}{=} 9-25$$
$$-16 = -16 \checkmark$$

12 b) $\left(\frac{3}{4}(6-x)\right) = \left(\frac{1}{3}(4x+5) + 2\right) 12$

$LCD = 12$

$$\overset{3}{\cancel{12}}\left(\frac{3}{\cancel{4}}\right)(6-x) = \frac{1}{\cancel{3}}\overset{4}{\cancel{12}}(4x+5)+2(12)$$

$$9(6-x) = 4(4x+5)+24$$
$$54-9x = 16x+20+24$$
$$54-9x = 16x+44$$
$$-44 \qquad\qquad -44$$
$$10-9x = 16x$$
$$+9x \quad +9x$$
$$\frac{10}{25} = \frac{25x}{25}$$
$$\boxed{\frac{2}{5} = x}$$

c) $0.2(8-x) = 0.3x + 4$

$$1.6 - 0.2x = 0.3x + 4$$
$$10(1.6 - 0.2x) = 10(0.3x+4)$$
$$16 - 2x = 3x + 40$$
$$+2x \quad +2x$$
$$16 = 5x + 40$$
$$-40 \qquad -40$$
$$\frac{-24}{5} = \frac{5x}{5}$$
$$\left(\frac{2}{2}\right)\left(\frac{-24}{5}\right) = x$$
$$\frac{-48}{10} = x$$
$$\boxed{-4.8 = x}$$