Math 115

Spring 2017

Lecture 5

Solve:

① $3(x-7) + 2x = 5(x+1) - 26$

$3x - 21 + 2x = 5x + 5 - 26$

$5x - 21 = 5x - 21$

$5x - 5x = -21 + 21$

$\mathbb{R}$

$0 = 0$ True

Infinitely Many Solns. Identity

② $4(2x+3) - 3x = -(-5x+4) - 8$

$8x + 12 - 3x = 5x - 4 - 8$

$5x + 12 = 5x - 12$

$5x - 5x = -12 - 12$

$0 = -24$ False

No Soln, ϕ, $\{\ \}$ Contradiction.

Solve for specific Variable:

1) $P = 2L + 2W$ for W

$P - 2L = 2W \rightarrow \boxed{W = \dfrac{P-2L}{2}}$

2) $A = P(1+r)$ for P

$\boxed{\dfrac{A}{1+r} = P}$

3) $2x + 3y = 10$
          for y.

$3y = 10 - 2x$

$\boxed{y = \dfrac{10-2x}{3}}$

Solve for y, write ans in $y = mx + b$

$2x + 5y = 10$

$5y = -2x + 10$

$y = \dfrac{-2}{5}x + \dfrac{10}{5}$ $\boxed{y = \dfrac{-2}{5}x + 2}$

Solve for y, ans in $y = mx + b$ form

① $2x - 3y = 9$ ⭐

$-3y = -2x + 9$

$y = \dfrac{-2}{-3}x + \dfrac{9}{-3}$

$\boxed{y = \dfrac{2}{3}x - 3}$

② $4x - 5y = -10$ ⭐

$-5y = -4x - 10$

$y = \dfrac{-4}{-5}x - \dfrac{10}{-5}$

$\boxed{y = \dfrac{4}{5}x + 2}$

③ $\dfrac{2}{3}x + \dfrac{3}{4}y = 1$ Hint: use LCD to clear fractions.

LCD = 12

$\overset{4}{\cancel{12}} \cdot \dfrac{2}{3}x + \overset{3}{\cancel{12}} \cdot \dfrac{3}{4}y = 12 \cdot 1$

$8x + 9y = 12 \rightarrow y = \dfrac{-8}{9}x + \dfrac{\overset{4}{\cancel{12}}}{\underset{3}{\cancel{9}}}$

$9y = -8x + 12$

$\boxed{y = \dfrac{-8}{9}x + \dfrac{4}{3}}$

2

There were 53 people at a play. The number of kids was 1 more than 3 times the number of adults. How many of each?

$\boxed{\text{Kids}} + \boxed{\text{Adults}} = 53$

kids → $3x + 1$

Adults → x

$3x + 1 + x = 53$

$4x + 1 = 53$

$4x = 52$

$\boxed{x = 13}$

13 Adults & 40 kids

The length of a rectangle is 3 ft shorter than 4 times its width. Perimeter is 64 ft. Find its area.

$2L + 2W = 64$

$2(4x - 3) + 2(x) = 64$

$8x - 6 + 2x = 64$

$10x = 70$

$\boxed{x = 7}$

$P = 64,$
$P = 2L + 2W$
$A = LW$

$w = x$

$L = 4x - 3$

width → 7 ft
Length → 25 ft

$A = LW = 25(7)$

$\boxed{A = 175 \text{ ft}^2}$

Solving linear inequalities:

final Ans. $x < a$, $x \leq a$, $x > a$, $x \geq a$

$b < x < a$, $b < x \leq a$, $b \leq x < a$

$b \leq x \leq a$

Do everything like Solving linear equation but reverse the inequality direction following multiplication or division by a neg. number.

Solve $-2x + 5 \leq -7$ → $-2x \leq -12$ → $x \geq 6$

$-2x \leq -7-5$ → $\frac{-2}{-2}x \geq \frac{-12}{-2}$

$2(x-1) + 5 > 4x - 13$

$2x - 2 + 5 > 4x - 13$

$2x + 3 > 4x - 13$

$2x - 4x > -13 - 3$

$-2x > -16$

Divide by -2 → $\frac{-2}{-2}x < \frac{-16}{-2}$

$x < 8$

Solve : $-3(x+2) -8 \le 2x +6$

$$-3x -6 -8 \le 2x +6$$

$$-3x -14 \le 2x +6$$

$$-3x -2x \le 6 +14$$

$$-5x \boxed{\le} 20$$

$$\frac{-5}{-5}x \boxed{\ge} \frac{20}{-5}$$

$$\boxed{x \ge -4}$$

The **difference** of $\boxed{7}$ **and** $\boxed{3 \text{ times some number}}$

$\boxed{\text{exceeds}}$

$-8.$

find all such numbers. Let x be all such numbers

Exceed $>$

at least $\ge$

at most $\le$

$$7 - 3x > -8$$

$$-3x > -8 -7$$

$$-3x \boxed{>} -15$$

$$\frac{-3}{-3}x \boxed{<} \frac{-15}{-3} \quad \rightarrow x < 5$$

$\boxed{\text{less than } 5}$

Daily rental for a Pick-up at Home Depot is $30 plus (5¢) per mile. $\rightarrow 5¢ \rightarrow \$.05$

Your budget is $100, and you need this Pick up for one day. How many miles can you drive to stay within your budget?

Your entire cost ≤ 100

$$30 + .05 M \leq 100$$

$$.05 M \leq 100 - 30$$

$$.05 M \leq 70$$

$$M \leq \frac{70}{.05}$$

$$\boxed{M \leq 1400}$$

Max. is 1400 miles

at most 1400 miles.

Solve $7 \leq 2x \boxed{-1} \leq 15$

$$7 + 1 \leq 2x - 1 + 1 \leq 15 + 1$$

$$8 \leq 2x \leq 16$$

$$\frac{8}{2} \leq \frac{2}{2}x \leq \frac{16}{2}$$

$$\boxed{4 \leq x \leq 8}$$

Solve $-5 < 3x + 1 \leq 13$

$$-5 - 1 < 3x + 1 - 1 \leq 13 - 1$$

$$-6 < 3x \leq 12$$

$$\frac{-6}{3} < \frac{3}{3}x \leq \frac{12}{3}$$

$$\boxed{-2 < x \leq 4}$$

Solve $3 \leq -2x + 3 < 17$

$3 - 3 \leq -2x + 3 - 3 < 17 - 3$

$0 \boxed{\leq} \boxed{-2x} \boxed{<} 14$

Large #
on the right

$\dfrac{0}{-2} \boxed{\geq} \dfrac{-2}{-2}x > \dfrac{14}{-2}$

$\boxed{-7 < x \leq 0}$

$\boxed{0 \geq x > -7}$ ✓

Smaller #
on the left
hand side

Solve $-8 \leq -5x + 2 < 22$

$-8 - 2 \leq -5x < 22 - 2$

$-10 \boxed{\leq} \boxed{-5}x \boxed{<} 20$

$\dfrac{-10}{-5} \boxed{\geq} \dfrac{-5}{-5}x \boxed{>} \dfrac{20}{-5}$

larger

$\boxed{2 \geq x > -4}$ ✓ $\Rightarrow$ $\boxed{-4 < x \leq 2}$

Smaller

When solving inequalities, we can write
final ans in 3-ways
① Set-builder notation $\{x|$ $\}$ ← Ans.
               ↗ Such that

② Graphing ←――――――――――→
          use (,) for < or >, use [,]

③ Interval notation   for ≤, ≥
    (,) or (,], [,), [,]

Solve, express final ans in all 3 ways.

$-3x + 7 < -5$ ① S.B.N. $\{x| \; x>4\}$

$-3x < -5 - 7$ ↗
$-3x \boxed{<} -12$ Such that

$\dfrac{-3}{-3}x > \dfrac{-12}{-3}$ ② Graphing

$x > 4$ No = sign

                           4   ∞

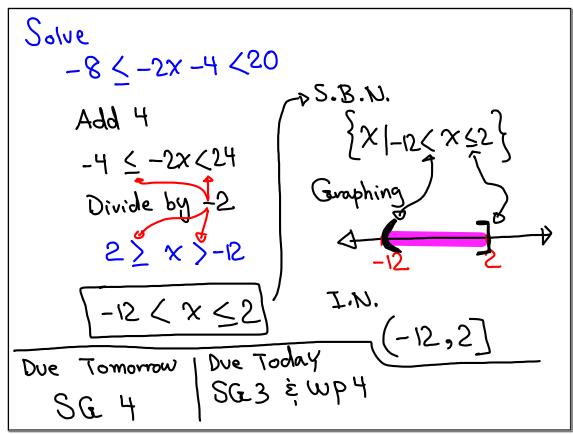   ③ Interval Notation
            $(4, \infty)$

Solve, final ans in all 3-ways:

$$2x + 8 \geq 4(x-3) - 1$$

$$2x + 8 \geq 4x - 12 - 1$$

$$2x + 8 \geq 4x - 13$$

$$2x - 4x \geq -13 - 8$$

$$-2x \underline{\geq} -21$$

$$\frac{-2}{-2}x \leq \frac{-21}{-2}$$

$$x \leq \frac{21}{2} \qquad x \leq 10.5$$

① S.B.N.

$$\{x \mid x \leq 10.5\}$$

with = sign

② Graph

$-\infty$ \qquad 10.5

③ I.N.

$$(-\infty, 10.5]$$

Solve

$$-2 \leq 3x + 4 < 19$$

Subtract 4

$$-6 \leq 3x < 15$$

Divide by 3

$$-2 \leq x < 5$$

① S.B.N. $\{x \mid -2 \leq x < 5\}$

② Graph

-2 \qquad 5

③ I.N.

$$[-2, 5)$$

Solve

$-8 \leq -2x - 4 < 20$

Add 4

$-4 \leq -2x < 24$

Divide by -2

$2 \geq x > -12$

$$\boxed{-12 < x \leq 2}$$

S.B.N.

$\{x \mid -12 < x \leq 2\}$

Graphing

-12 2

I.N.

$(-12, 2]$

Due Tomorrow | Due Today

SG 4 | SG 3 & WP 4

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① Determine the type of equation:

$$3(2x - 5) - 2(3x - 7) = -1$$

② Solve for y: $3x - 2y = 8$

Ans. in $y = mx + b$ form