April 18, 2018

# Math 115

# Spring 2018

# Lecture 7

$? \; a^2 + b^2 = c^2 \; ?$
$?$
$y = mx + b \quad d = rt$

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Solve, express your final answer in
S.B.N., Graphing, and I.N.

① $-4x + 20 < 0$

$-4x < -20$
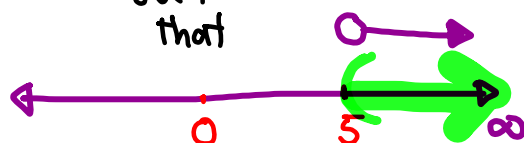
$\dfrac{-4}{-4}x > \dfrac{-20}{-4}$

$x > 5$

S.B.N. $\{x \mid x > 5\}$

Such that

I.N. $(5, \infty)$

② $7x + 3 \geq 9x - 7$

$7x - 9x \geq -7 - 3$
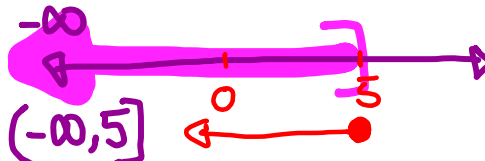
$-2x \geq -10$

$\dfrac{-2}{-2}x \leq \dfrac{-10}{-2}$
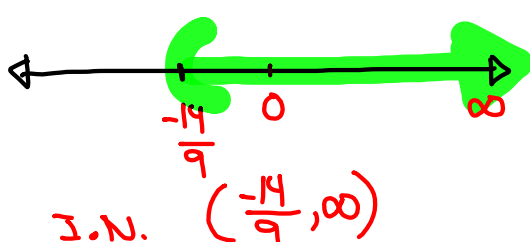
$x \leq 5$

S.B.N. $\{x \mid x \leq 5\}$

$-\infty$

$(-\infty, 5]$

③ $4 - x < 8x + 18$

$-x - 8x < 18 - 4$

$-9x \boxed{<} 14$

$x > \dfrac{14}{-9}$

S.B.N. $\left\{ x \mid x > \dfrac{-14}{9} \right\}$



I.N. $\left( \dfrac{-14}{9}, \infty \right)$

④ $-2(x-4) - 3x \leq -(4x+1) + 2x$

$-2x + 8 - 3x \leq -4x - 1 + 2x$
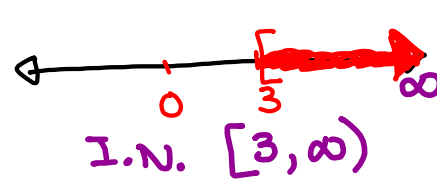
$-5x + 8 \leq -2x - 1$

$-5x + 2x \leq -1 - 8$

$-3x \boxed{\leq} -9$

$x \geq \dfrac{-9}{-3} \qquad x \geq 3$

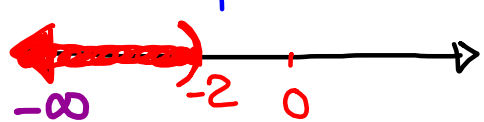S.B.N. $\left\{ x \mid x \geq 3 \right\}$



I.N. $[3, \infty)$

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Suppose $x < -2$

① S.B.N.

$\left\{ x \mid x < -2 \right\}$

② Graph



③ I.N. $(-\infty, -2)$

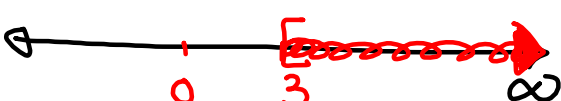Suppose



① S.B.N.

$\left\{ x \mid x \geq 3 \right\}$

② I.N.

$[3, \infty)$

Suppose $(-2, 7]$

① Graph



-2    7

② S.B.N.

$$\{x \mid -2 < x \leq 7\}$$

Solve for $y$:

$3x - 4y > 8$

$-4y \boxed{>} -3x + 8$

$\dfrac{-4}{-4}y < \dfrac{-3}{-4}x + \dfrac{8}{-4}$

$$\boxed{y < \frac{3}{4}x - 2}$$

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Solve

$-3 < 2x - 5 \leq 7$

we want to isolate $x$ in the middle

$-3 + 5 < 2x \cancel{-5 + 5} \leq 7 + 5$

$2 < 2x \leq 12$

$\dfrac{2}{2} < \dfrac{2}{2}x \leq \dfrac{12}{2}$

$1 < x \leq 6$

S.B.N. $\{x \mid 1 < x \leq 6\}$

Graph



1    6

I.N.   $(1, 6]$

Solve

$-2 \leq 3x + 7 \leq 28$

$-2 - 7 \leq 3x + 7 - 7 \leq 28 - 7$

$-9 \leq 3x \leq 21$

$\dfrac{-9}{3} \leq \dfrac{3}{3}x \leq \dfrac{21}{3}$

$-3 \leq x \leq 7$

S.B.N. $\{x \mid -3 \leq x \leq 7\}$

Graph



-3        7

I.N.   $[-3, 7]$

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$1 < 3 - 2x \leq 11$

$1 < -2x + 3 \leq 11$

$1 - 3 < -2x + 3 - 3 \leq 11 - 3$

$-2 \boxed{<} -2x \boxed{\leq} 8$
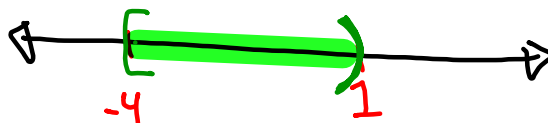
$\dfrac{-2}{-2} > \dfrac{-2}{-2}x \geq \dfrac{8}{-2}$

$1 > x \geq -4$

S.B.N. $\{x \mid 1 > x \geq -4\}$

S.B.N. $\{x \mid -4 \leq x < 1\}$



-4        1

I.N.   $[-4, 1)$

Integers: $\{\ldots, -3, -2, -1, 0, 1, 2, 3, 4\ldots\}$

Consecutive integers

2, 3, 4, 5, ----·

27, 28, 29, ----·

100, 101, 102, ---

−43, −42, −41, −40, ----·

$x, x+1, x+2, x+3, \ldots$

The (Sum) of [two Consecutive integers] (is) (49.) find both integers

$x$ & $x+1$

$\boxed{x} + \boxed{x+1} = 49 \quad \to 2x = 48$ (24 & 25)

$2x + 1 = 49 \qquad x = \dfrac{48}{2}$

$2x = 49 - 1 \qquad x = 24$
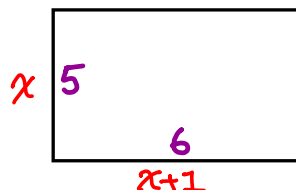
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The perimeter of a rectangular room is 22 meters. length and width are two consecutive integers.

① Draw & label

$x$ | 5
6
$x+1$

③ find its area.

$A = LW$

$= 5(6)$

$\boxed{A = 30m^2}$

② find its dimensions

$P = 22m$

$2L + 2W = 22$

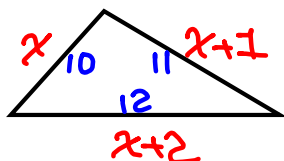$2(x+1) + 2(x) = 22$

$2x + 2 + 2x = 22$

$4x + 2 = 22$

$4x = 20$

$x = 5$

Dimensions: 5m by 6m

The perimeter of a triangular shape is 33 ft.

All sides are three consecutive integers.

Find the largest side.

$$P = 33$$

$$\boxed{a} + \boxed{b} + \boxed{c} = 33$$

$x$   10   11   $x+1$
12
$x+2$

$$x + x+1 + x+2 = 33$$

$$3x + 3 = 33$$

$$3x = 30$$

$$x = 10$$

12 ft

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Consecutive Even Integers:

2, 4, 6, 8, 10, - - - -

102, 104, 106, 108, - - - -

-66, -64, -62, -60, - - - -

start with even → $x$, $x+2$, $x+4$, $x+6$, - - - -

find two consecutive even integers such that the sum of 3 times the smallest one and the largest one is 42.
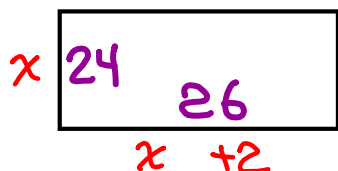
$x$ & $x+2$

10 & 12

$$3x + x+2 = 42$$

$$4x + 2 = 42$$

$$4x = 40$$

$$x = 10$$

The perimeter of a rectangular pool is 100 ft. length & width are two consecutive ~even~ integers. find its dimensions.

$$P = 100$$

$$2L + 2W = 100$$

$x$ | 24
26
$x$ +2

$$2(x+2) + 2(x) = 100$$

$$2x + 4 + 2x = 100$$

$$4x = 96$$

$$x = 24$$

**24 ft by 26 ft**

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Two cons. odd integers

$$1, 3, 5, 7, \cdots$$

$$29, 31, 33, 35, \cdots$$

$$-71, -69, -67, -65,$$

$$x, \ x+2, \ x+4$$

has to be odd

find two consecutive odd integers such that their sum is 45.

$$x + x+2 = 45$$

$$2x = 43 \qquad x = 21.5$$

Not integer

find two consecutive odd integers such that four times the smaller one reduced by the larger one is equal to 31.

$x$ & $x+2$

$11$ & $13$

$$4 \cdot x - (x+2) = 31$$
$$4x - x - 2 = 31$$
$$3x - 2 = 31$$
$$3x = 33$$
$$x = 11$$

Volume of a Circular Cone is $V = \frac{1}{3}\pi r^2 h$
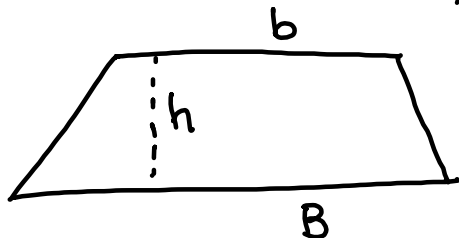
Solve for h:

Isolate h

$$V = \frac{1}{3}\pi r^2 h$$

clear fraction by LCD = 3

$$3V = 3 \cdot \frac{1}{3}\pi r^2 h$$

$$3V = \pi r^2 h$$

$$\frac{3V}{\pi r^2} = h$$

Area of a trapezoid     $A = \dfrac{h(B+b)}{2}$



Solve for B.

$A = \dfrac{h(B+b)}{2}$   $\Rightarrow LCD = 2$

$2A = h(B+b)$

$\dfrac{2A}{h} = B + b$

$\boxed{\dfrac{2A}{h} - b = B}$

Solve for y

$\dfrac{x}{2} - \dfrac{y}{5} = 1$     $5x - 2y = 10$

LCD = 10

$\overset{5}{\cancel{10}} \cdot \dfrac{x}{2} - \overset{2}{\cancel{10}} \cdot \dfrac{y}{5} = 10 \cdot 1$

$-2y = -5x + 10$

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

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

Translate

The [Sum] of twice $x$ [and] 5 [is less than] 20.

$$2x + 5 < 20$$

Translate and Solve

[Difference] of 12 [and] twice some number exceeds 50. find all such numbers.

$$12 - 2x > 50$$

$$-2x > 50 - 12$$

$$-2x > 38$$

$$\frac{-2}{-2}x < \frac{38}{-2}$$

$$x < -19$$

All numbers less than −19.

SG 5 due Thursday

Work on SG 6

lecture first, followed by exam.