P2 Lines, Interval notation, absolute value

I. Lines

slope $m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$

slope-intercept form: $y = mx + b$ (start here)

point-slope: $y_2 - y_1 = m(x_2 - x_1)$

$y_2 = m(x_2 - x_1) + y_1$

advantage: given (1,2) (-1,0)

$m = \frac{\Delta y}{\Delta x} = \frac{-2}{-2} = 1$

choose (-1,0): $y - 0 = 1(x+1)$ pt-slope

$y = x + 1$ slope-int

using (1,2): or, $y - 2 = 1(x-1)$

Perpendicular lines $m_2 = -\frac{1}{m_1}$

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II. Interval notation

1. Graphing

$0 < x < 2$ $x \in (0,2)$

$0 \le x \le 2$ $x \in [0,2]$

$0 \le x < 2$ $x \in [0,2)$

2. Inequalities

ex. $2x - 5 < 7$

$2x < 12$

$x < 6$ or $x \in (-\infty, 6)$

ex. $x^2 < x + 6$

$x^2 - x - 6 < 0$

$(x-3)(x+2) < 0$

if = 0, $x = 3, -2$

test intervals: A, B, C

A: let $x = -3$ $(-)(-) \overset{?}{<} 0$ no

B: let $x = 0$ $(-)(+) \overset{?}{<} 0$ yes

C: let $x = 4$ $(+)(+) < 0$ no

$\therefore x \in (-2, 3)$

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III. Absolute Value

1. $|7 - x| \le 15$

$|x| \le 15$

Definition: $|a| = \begin{cases} a, & a \ge 0 \\ -a, & a < 0 \end{cases}$

$-15 \le x \le 15$

1. $7 - x \le 15$

$-x \le 8$

$x \ge -8$

given $7 - x \ge 0$ ignore

2. if $7 - x < 0$

$-(7 - x) \le 15$

$-7 + x \le 15$

$x \le 22$

$-8 \le x \le 22$ or $x \in [-8, 22]$

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2. $|7 + x| > 12$ $-12 > 7 + x > 12$ why??

(1) $7 + x > 12$

$x > 5$

(2) $-(7 + x) > 12$

$-7 - x > 12$

$-x > 19$

$x < -19$

$x \in (-\infty, -19) \cup (5, \infty)$

Set Notation

$A = \{1, 2, 3\}$

$B = \{0, 1, 2\}$

$C = \{4, 5, 6\}$

$A \cap B = \{1, 2\}$ (intersect)

$A \cup B = \{0, 1, 2, 3\}$ (union)

$A \cap C = \emptyset$ or $\{\}$

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"Centering Principle"

Circle: $x^2 + y^2 = r^2$

$(x-h)^2 + (y-k)^2 = r^2$

center (h, k)

Ex: $(x-2)^2 + (y+3)^2 = 25$

center: (2, -3)

Absolute Value: $|x - c| \le r$

Graph $|x| > 1$

$|x - 0| > 1$ $c = 0$

$|x - 2| \ge 1$

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