

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:  $y = mx + b$   
 (0) (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

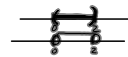
using  $(1,2)$ : or,  $y - 2 = 1(x - 1)$

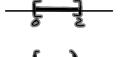
Perpendicular lines  $m_2 = -\frac{1}{m_1}$


Sep 10-1:44 PM

II. Interval notation

1. Graphing

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

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

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

2. Inequalities

ex.  $2x - 5 < 7$   
 $2x < 12$   
 $x < 6$  or  $x \in (-\infty, 6)$

ex.  $x < x + 6$   
 $x^2 - x - 6 < 0$   
 $(x-3)(x+2) < 0$   
 if  $\neq 0$ ,  $x = 3, -2$

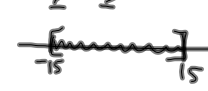
test intervals:  
 A: let  $x = -3$   $(-)(-) < 0$  no  
 B: let  $x = 0$   $(-)(+) < 0$  yes  
 C: let  $x = 4$   $(+)(+) < 0$  no  
 $\therefore x \in (-2, 3)$

Sep 10-1:47 PM

III. Absolute Value

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

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

$|x| \leq 15$   
 $15 \leq x \leq 15$   
 $\geq \geq$   


1.  $7-x \leq 15$   
 $-x \leq 8$   
 $x \geq -8$

2.  $\infty$  if  $7-x < 0$   
 $-(7-x) \leq 15$   
 $-7+x \leq 15$   
 $x \leq 22$

when  $7-x \geq 0$  ignore


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

Sep 10-1:50 PM

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  $\{\}$  (empty set)

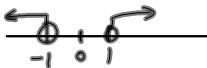
Sep 10-1:52 PM

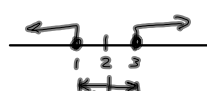
"Centering Principle"

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:  $|x-c| \leq r$

Graph  $|x| > 1$   


$|x-0| > 1$   
 $c=0$   
 $|x-2| \geq 1$   


Sep 10-1:53 PM



Sep 8-8:34 AM