

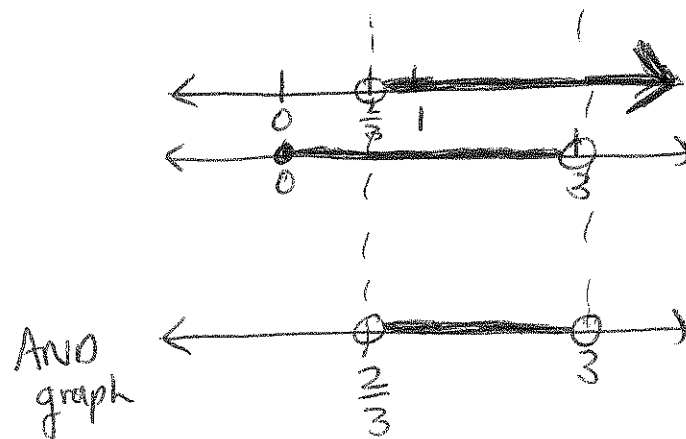
1.7 A AND/OR

A. AND/OR

We can combine intervals (or inequalities) using AND/OR.

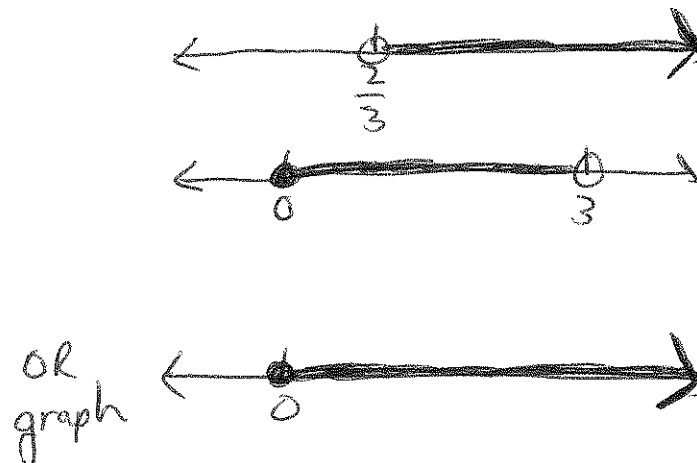
1. AND: both statements must be true
"OVERLAP IN COMMON"

i.e. Find the "AND" graph for the following



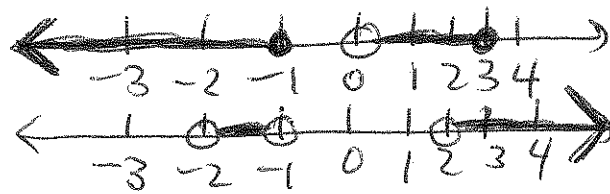
fill point in
only if filled
in on both
graphs

2. OR: only one needs to be true "WET INK"



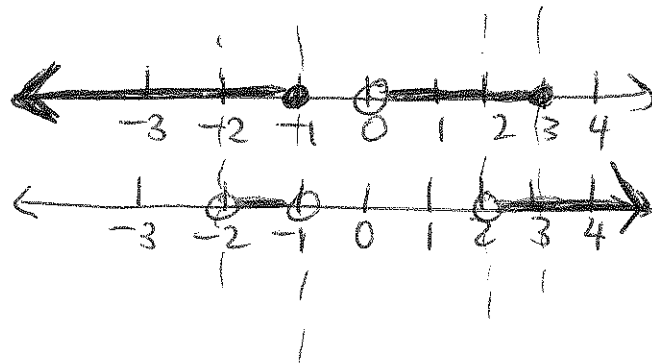
B. AND/OR Examples

Example: Given the two number lines as shown



Find the AND and OR graphs.
Write each result in interval notation.

Solution



$\subseteq$ Given

AND



$$(-2, -1) \cup (2, 3]$$

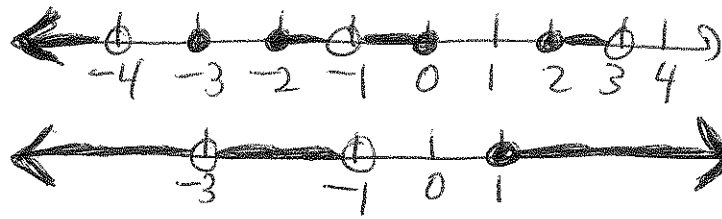
OR



(smash two lines together)

$$(-\infty, -1] \cup (0, \infty)$$

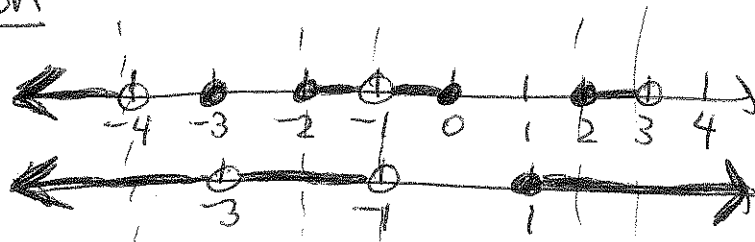
Example 2: Given the two number lines as shown



Find the AND and OR graphs.

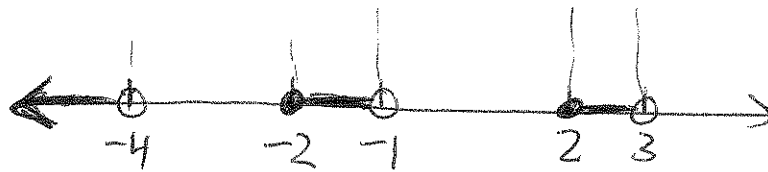
Write each result in interval notation.

Solution



← Given

AND



$$(-\infty, -4) \cup [-2, -1) \cup [2, 3]$$

OR



(smash two lines together)

$$(-\infty, -1) \cup (-1, 0] \cup [1, \infty)$$

C. Inequalities with AND or OR

Strategy

1. Solve each inequality separately.
2. Plot each inequality
3. Find the AND/OR graph and write in interval notation.

Example: Solve $5x-3 < 2$ AND $1-3x < -5$

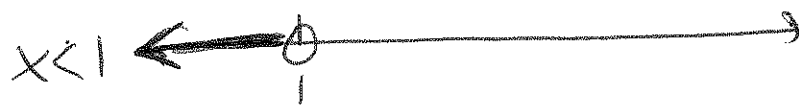
Solution

$$5x-3 < 2 \quad \text{AND} \quad 1-3x < -5$$

$$5x < 5 \quad \text{AND} \quad -3x < -6$$

$$x < 1 \quad \text{AND} \quad x > 2$$

Now put each on a number line, and do AND.



~~AND~~
AND (no overlap)

Ans: $\boxed{\emptyset}$

Example 2: Solve $5x-3 < 2$ OR $1-3x < -5$

Solution

$$5x-3 < 2 \quad \text{OR} \quad 1-3x < -5$$

$$5x < 5 \quad \text{OR} \quad -3x < -6$$

$$x < 1 \quad \text{OR} \quad x > 2$$

Now plot...



Ans: $\boxed{(-\infty, 1) \cup (2, \infty)}$

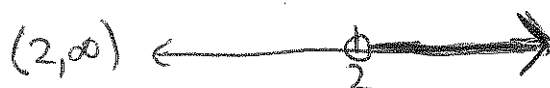
D. Comments on Union and Intersection

1. Union: $\cup$ is the union symbol. It means OR.

2. Intersection: $\cap$ is the intersection symbol. It means AND

Example: Find $(-1, 3] \cap (2, \infty)$

Solution



Ans: $\boxed{[2, 3]}$