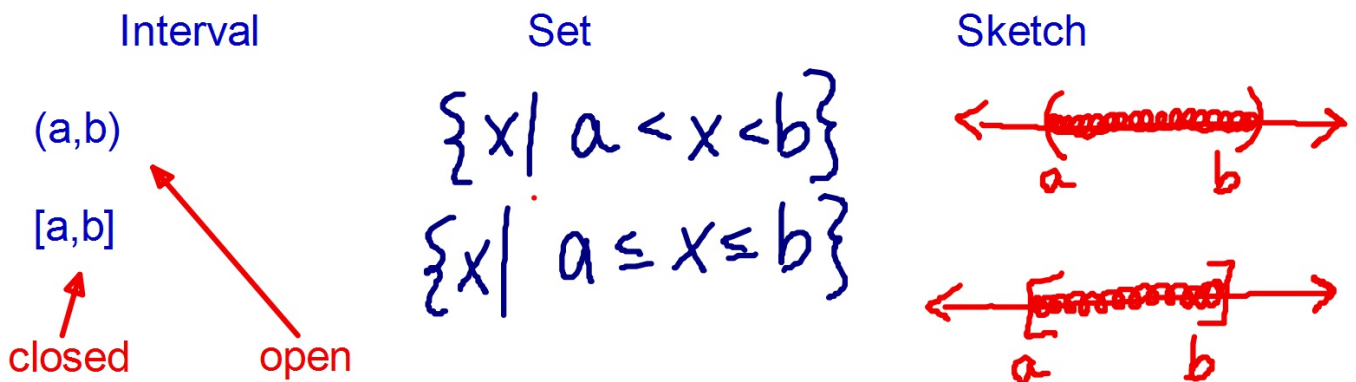


Sec 1.7.1
Expressing Solutions in Intervals

Two types of notations- interval and set



parenthesis- endpoint(s) is not part of solution interval
brackets- endpoint(s) are included

Variations-

$$(a, \infty) \quad \{x \mid x > a\} \quad \leftarrow \begin{array}{c} \text{-----} \\ a \end{array} \rightarrow$$

$$(-\infty, a] \quad \{x \mid x \leq a\} \quad \leftarrow \begin{array}{c} \text{-----} \\ a \end{array} \rightarrow$$

$$(-\infty, \infty) \quad \{x \mid x \in \mathbb{R}\}$$

These three are referred to as infinite intervals.

Express each interval in set notation and graph-

$$(-2, 4]$$

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

A number line with tick marks at -2 and 4. A wavy line segment is drawn between -2 and 4. A parenthesis '(' is at -2 and a bracket ']' is at 4.

$$(6, \infty)$$

$$\{x \mid x > 6\}$$

A number line with a tick mark at 6. A wavy line segment starts at 6 and extends to the right. A parenthesis '(' is at 6 and an arrow points to the right.

$$[-3, 3]$$

$$\{x \mid -3 \leq x \leq 3\}$$

A number line with tick marks at -3 and 3. A wavy line segment is drawn between -3 and 3. Brackets '[' and ']' are at -3 and 3 respectively.

optional \rightarrow $\{x \mid |x| \leq 3\}$

Unions and Intersections ...of sets

Unions- set of elements in both sets...combining the sets

Symbol- $A \cup B$

Formal definition- The union of sets A and B, written $A \cup B$, is the set of elements that are members of set A or set B.

$A \cup B = \{x \mid x \text{ is an element of A or } x \text{ is an element of B}\}$

adding

Intersections-

...what the two sets have in common, what is in BOTH
...in a graph, where they overlap

Symbol- $A \cap B$

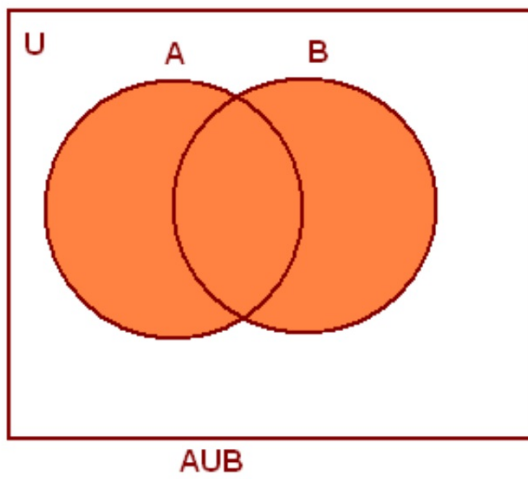
Formal definition-

The intersection of sets A and B, $A \cap B$, is the set of elements common to both set A and set B.

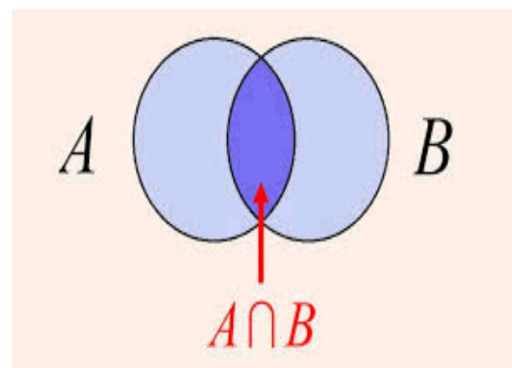
$A \cap B = \{x \mid x \text{ is an element of A and } x \text{ is an element of B}\}$

A visual...

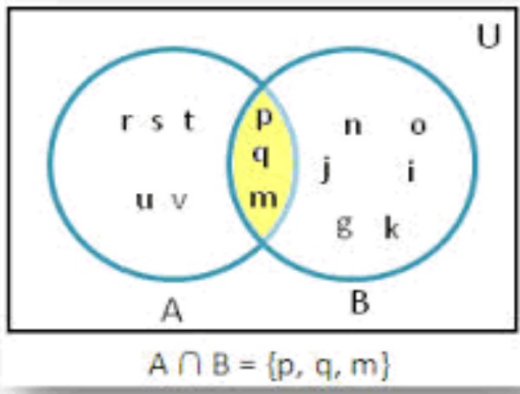
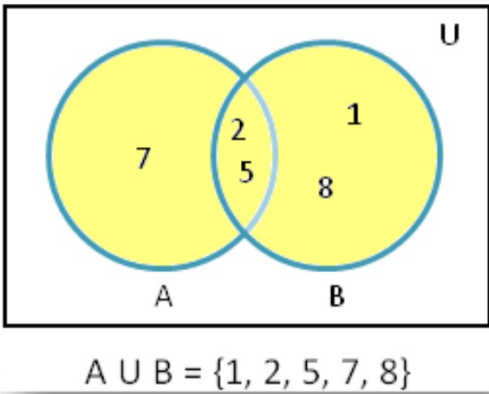
Union...



Intersection...



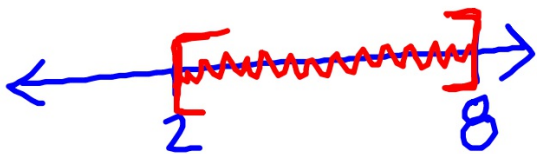
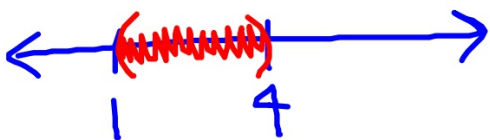
Another visual



-Finding Intersections and Unions of Intervals-

Use graphs to find each set:

$$(1,4) \cap [2,8] \rightarrow [2,4)$$



smallest # in both? 2
largest? 4*

$$(1,4) \cup [2,8] \rightarrow (1,8]$$

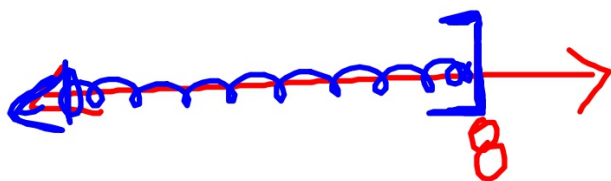
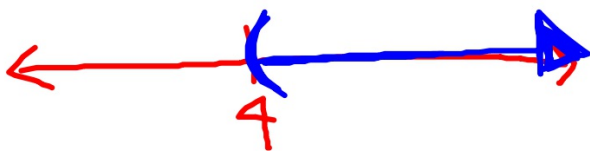
smallest # in either
1
largest? 8

Answer in interval notation (the notation initially used)...

Use graphs to determine each set-

$$(4, \infty) \cap (-\infty, 8]$$

$$\longrightarrow (4, 8]$$



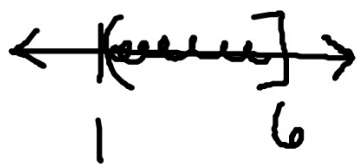
$$(4, \infty) \cup (-\infty, 8]$$

$$(-\infty, \infty)$$

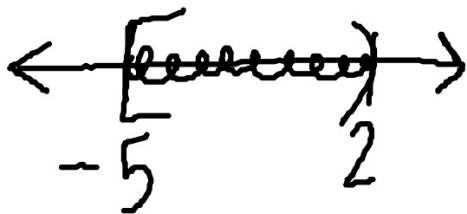
Suggested Practice

Sec 1.7
page 195-196
1-14 odds
15-26 all

1. $\{x \mid 1 < x \leq 6\}$

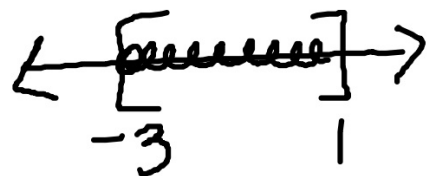


3. $\{x \mid -5 \leq x < 2\}$

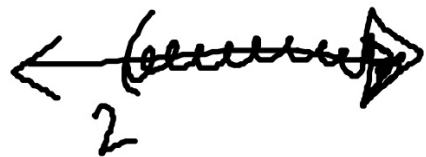


5.

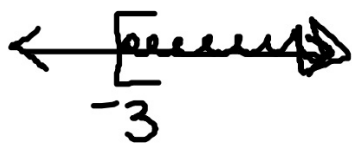
$\{x \mid -3 \leq x \leq 1\}$



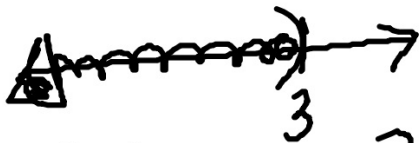
7. $\{x \mid x > 2\}$



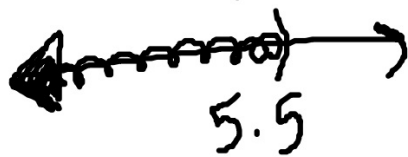
9. $\{x | x \geq -3\}$



11. $\{x | x < 3\}$



13. $\{x | x < 5.5\}$



15. $[-1, 0)$

16. $[-2, 0)$

17. $(-3, 2]$

18. $(-4, 1]$

19. $[1, 5)$

$$20. [2, 6)$$

$$24. (4, \infty)$$

$$21. (-\infty, 8)$$

$$25. [3, \infty)$$

$$22. (-\infty, 9)$$

$$26. [2, \infty)$$

$$23. (6, \infty)$$