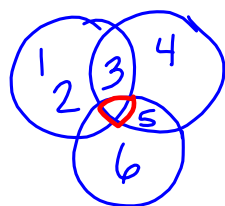


## Sec. 3.8 Unions and Intersections of Sets

### Vocabulary

- union: the set that contains all elements of two or more sets



$$A \cup B$$

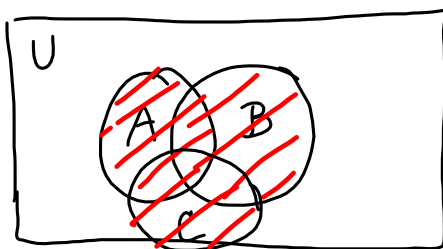
$$A = \{1, 2, 3\}$$

$$B = \{3, 4, 5\}$$

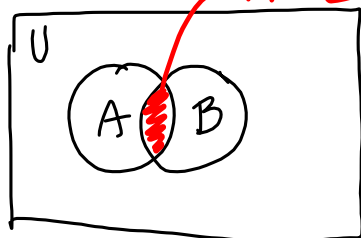
$$A \cup B = \{1, 2, 3, 4, 5\}$$

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

$$A \cup B \cup C = \{1, 2, 3, 4, 5, 6\}$$



- intersection: the set of elements that are common to every set; an element is in the intersection if it belongs to all of the sets.

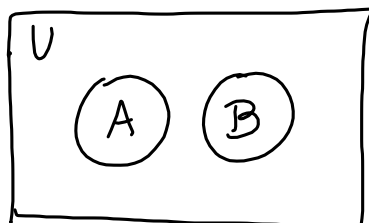


$$A \cap B = \{3\}$$

$$B \cap C = \{5\}$$

$$A \cap B \cap C = \{\}$$

- disjoint sets: have no elements in common. The intersection of disjoint sets is the empty set.



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

$$B = \{3, 4\}$$

$$A \cap B = \{\} \text{ or } \emptyset$$

$$A \cup B = \{1, 2, 3, 4\}$$

Problem 1: Suppose that in a box, there is a brush, marker, and pencil. In another box, there is a calculator, marker, ribbon, and brush. What items are in either box?

a brush, marker, pencil, calculator, and ribbon

Problem 2:

Set  $X = \{x \mid x \text{ is a whole number less than } 15\}$   $\{0, 1, 2, \dots, 14\}$

Set  $Y = \{y \mid y \text{ is an odd integer}\}$   $\{\dots, -3, -1, 1, 3, \dots\}$

Set  $Z = \{z \mid z \text{ is a multiple of } 4\}$   $\{\dots, -8, -4, 0, 4, 8, \dots\}$

What is  $X \cap Z$ ?  $X \cap Z = \{0, 4, 8, 12\}$

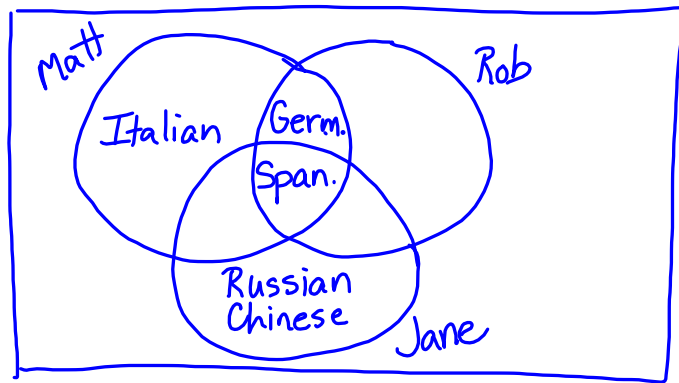
What is  $Y \cap Z$ ?  $Y \cap Z = \{\}$

Problem 3: Three friends are learning new languages. Draw a Venn diagram to represent the union and intersection of these sets. Which language do all three friends have in common?

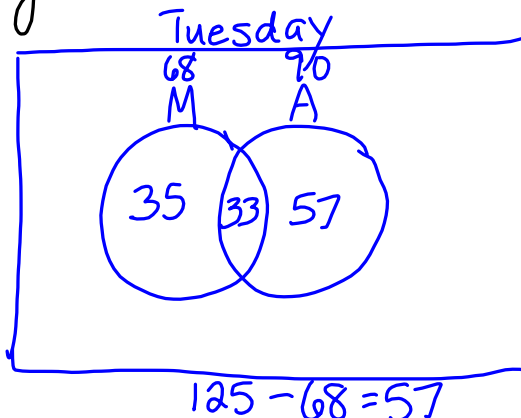
Matt: Spanish, German, Italian

Rob: Spanish, German

Jane: Russian, Chinese, Spanish



Problem 4: Of 125 students in the fifth grade, 68 have music on Tuesday and 33 have both music and art on Tuesday. How many students have art on Tuesday?



90 students