

*Linguistic Mapping*

# The Principles of Calculus I

I

Decomposition

I.1

The Algebra of Sets

*Classroom Exercises*

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## Exercise 1

Take  $X$  and  $Y$  to be the sets given by

$$X = \{a, b, c, d, e\} \quad \text{and} \quad Y = \{c, d, e, f, g, h\}.$$

Draw pictures that represent these equalities.

## Exercise 2

Take  $X$  and  $Y$  to be the sets given by

$$X = \{a, b, c, d, e\} \quad \text{and} \quad Y = \{c, d, e, f, g, h\}.$$

In plain English, write a sentence that describes the symbols

$$a \in X \quad \text{and} \quad X = \{a, b, c, d, e\}.$$

## Exercise 3

Take  $X$  and  $Y$  to be the sets given by

$$X = \{a, b, c, d, e\} \quad \text{and} \quad Y = \{c, d, e, f, g, h\}.$$

Determine whether this statement is true or false:  $\{a\} \in X$ .

## Exercise 4

Take  $X$  and  $Y$  to be the sets given by

$$X = \{a, b, c, d, e\} \quad \text{and} \quad Y = \{c, d, e, f, g, h\}.$$

In plain English, write a sentence that describes the symbols

$$\{b, c, d\} \subseteq X \quad \text{and} \quad \{b, c, d\} \subset X,$$

and provide a graphical representation of the meaning of these symbols.

## Exercise 5

Take  $X$  and  $Y$  to be the sets given by

$$X = \{a, b, c, d, e\} \quad \text{and} \quad Y = \{c, d, e, f, g, h\}.$$

Determine whether these statements are true or false:

(a)  $\{b, c, d\} \subseteq X$ ;

(b)  $\{b, c, d\} \subset X$ ;

(c)  $\{b, c, d\} \subseteq Y$ .

## Exercise 6

Take  $X$  and  $Y$  to be the sets given by

$$X = \{a, b, c, d, e\} \quad \text{and} \quad Y = \{c, d, e, f, g, h\}.$$

In plain English, write a sentence that describes the symbol  $X \cup Y$ .

## Exercise 7

Take  $X$  and  $Y$  to be the sets given by

$$X = \{a, b, c, d, e\} \quad \text{and} \quad Y = \{c, d, e, f, g, h\}.$$

In plain English, write a sentence that describes the symbol  $X \cap Y$ .



## Exercise 8

Take  $X$  and  $Y$  to be the sets given by

$$X = \{a, b, c, d, e\} \quad \text{and} \quad Y = \{c, d, e, f, g, h\}.$$

In plain English, write a sentence that describes the symbol  $X \setminus Y$ .

## Exercise 9

Take  $X$  and  $Y$  to be the sets given by

$$X = \{a, b, c, d, e\} \quad \text{and} \quad Y = \{c, d, e, f, g, h\}.$$

Identify the set  $X \cup Y$ .

## Exercise 10

Take  $X$  and  $Y$  to be the sets given by

$$X = \{a, b, c, d, e\} \quad \text{and} \quad Y = \{c, d, e, f, g, h\}.$$

Identify the set  $X \cap Y$ .

## Exercise 11

Take  $X$  and  $Y$  to be the sets given by

$$X = \{a, b, c, d, e\} \quad \text{and} \quad Y = \{c, d, e, f, g, h\}.$$

Identify the set  $X \setminus Y$ .

## Exercise 12

Take  $A$ ,  $B$ , and  $C$  to be sets. Use mathematical symbols to describe the set  $X$ , whose elements are in  $A$  or  $B$  but are not in  $C$ . Give an example of such a set  $X$  given any choice you like for  $A$ ,  $B$ , and  $C$ .

