

# Math 150 03 – Calculus I

## Homework assignment 1

Due: Wednesday, September 13, 2022

Write your answers on a separate sheet of paper. Write your name at the top of each page you use, and number each page. Remember to number your answers correctly.

1. Consider the following sets.

$$A = \{1, 3, 5, 7, 9\} \quad B = \{2, 4, 6, 8\} \quad C = \{1, 2, 3, 7, 8, 9\}$$

- (a) Calculate:

- i.  $A \cup B$  (The union of  $A$  and  $B$ .)
- ii.  $A \cap B$  (The intersection of  $A$  and  $B$ .)
- iii.  $A \cup B \cup C$
- iv.  $A \cap B \cap C$
- v.  $A \cup (B \cap C)$
- vi.  $(A \cup B) \cap C$

- (b) Consider the relation

$$R = \{(x, y) \in B \times A \mid y = x + 1\}$$

- i. Write out all the elements of  $R$ .
- ii. Draw arrows from left to right representing the relation  $R$ .

<u>B</u>	<u>A</u>
2	1
4	3
6	5
8	7
	9

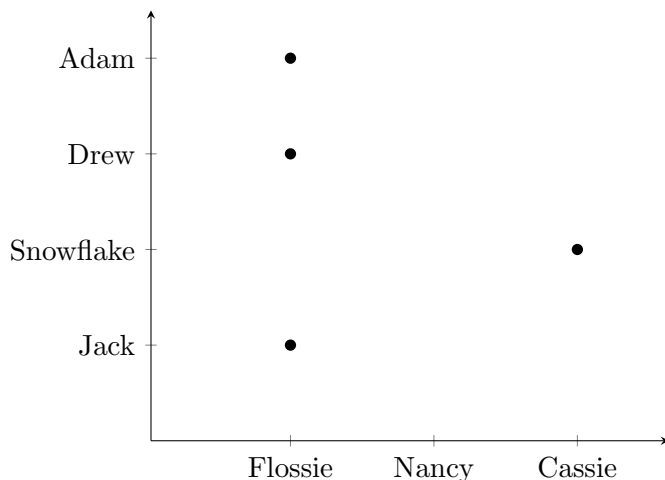
- iii. Draw the graph of the relation  $R$ .
- iv. Is  $R$  a function from  $B$  to  $A$ ? Explain.

2. Let  $A$  be the set of Old MacDonald's ewes (female sheep) and let  $B$  be the set of Old MacDonald's lambs.

$$A = \{\text{Flossie, Nancy, Cassie}\}$$

$$B = \{\text{Jack, Snowflake, Drew, Adam}\}$$

Let  $R$  be the relation  $R = \{(x, y) \in A \times B \mid \text{"}x \text{ is the mother of } y\text{"}\}$ . Here is the graph of  $R$ .



- Draw the graph of the relation  $Q = \{(x, y) \in B \times A \mid \text{"}y \text{ is the mother of } x\text{"}\}$ .
  - Compare the two graphs. What can you say about them?
  - Is the relation  $R$  a function? What about  $Q$ ? Explain.
  - In general, let  $M$  be the set of all mammals of some kind (for instance, let  $M$  be the set of all platypuses). Would the relation  $\{(x, y) \in M \times M \mid \text{"}x \text{ is the mother of } y\text{"}\}$  be a function from  $M$  to  $M$ ? What about the relation  $\{(x, y) \in M \times M \mid \text{"}y \text{ is the mother of } x\text{"}\}$ ?
3. Find the domain and the range of each of the following relations. Which of them are functions? Justify your answers.

