

Assignment 2

Math 1030

Due Friday, September 7th

Name: Solutions

1. Sets

For the sets:

$$A = \{1, 3, 5\}$$

$$B = \{2, 4, 5\}$$

$$C = \{2, 4, 6, \dots\}$$

answer:

$$(a) |A| = 3$$

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

$$(c) A \cap B = \{5\}$$

$$(d) A \cap C = \emptyset \text{ (no even numbers in } A)$$

$$(e) B - A = \{2, 4\}$$

2. Venn Diagrams

For the sets:

$R = \{\text{Ronald Reagan, Gerald Ford, Richard Nixon}\}$

$D = \{\text{Bill Clinton, Jimmy Carter, Lyndon Johnson, John Kennedy}\}$

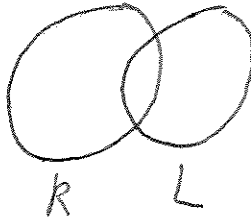
$L = \{\text{Jimmy Carter, Ronald Reagan, George Bush, Bill Clinton}\}$

Draw Venn diagrams indicating the relation between the sets:

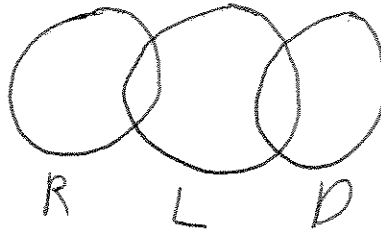
(a) R and D



(b) R and L

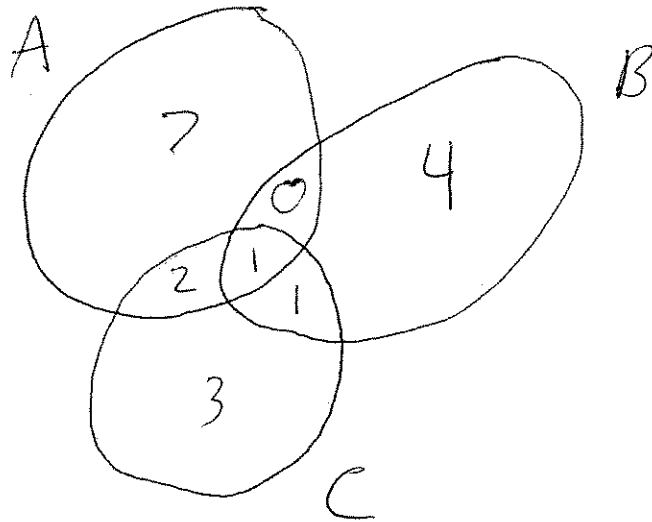


(c) R, D, and L



3. Using Venn Diagrams

Based on the Venn diagram below for the sets A, B, and C:



where the numbers indicate the number of elements in that particular region give the size of (also known as number of elements in or the cardinality of) the sets:

(a) $|A| = 10$

(b) $|A \cap B| = 1$

(c) $|A \cup B| = 5$

(d) $|A \cup B \cup C| = 18$

(e) $|(A \cap B) - C| = 0$

4. Analyzing Arguments

Analyze the validity of the following arguments. Say whether the argument is valid and whether the argument is sound, and explain why.

- (a) Socrates is a man.

Socrates is mortal.

Therefore, Socrates is mortal.

The logic is a valid deduction, and the premises are correct, so the argument is sound. Logic is affirming the hypothesis.

- (b) All math teachers have blonde hair.

Dylan Zwick has blonde hair.

Therefore, Dylan Zwick is a math teacher.

The logic is invalid as it is affirming the conclusion. The first premise is also false, so the argument is not sound.

- (c) All math teachers are giraffes.

Dylan Zwick is a math teacher.

Therefore, Dylan Zwick is a giraffe.

The logic is valid as it is affirming the hypothesis. It is not sound, as the first premise is false.