

Please put away all papers, phones, smart watches, headphones, and electronic devices *except* a calculator. Answer all of the following questions. Show enough work that it is clear how you arrived at your answer. Put a box/circle around your final answer to each question. Good luck!

1. Let  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$  be the universal set, and let  $A = \{2, 3, 5, 7\}$  and  $B = \{1, 3, 5, 7, 9\}$  be subsets of  $U$ .

(a) (2 points) True or false:  $\emptyset \subseteq U$  **True**

(b) (2 points) True or false:  $A \in U$  **False**

(c) (2 points) True or false:  $B \subseteq B$  **True**

(d) (4 points) Find  $A \cup B$ .

**$\{1, 2, 3, 5, 7, 9\}$**

THESE ARE THE ELEMENTS IN  
EITHER A OR B.

(e) (4 points) Find  $A \cap B'$ .

THESE ARE THE ELEMENTS IN A  
AND NOT IN B.

**$\{2\}$**

note:  $(A \cap B')' = A' \cup B$

$(A' \cup B)' = A \cap B'$

(f) (4 points) Find  $A' \cup B$ .

THESE ARE THE ELEMENTS THAT ARE  
EITHER NOT IN A OR IN B.

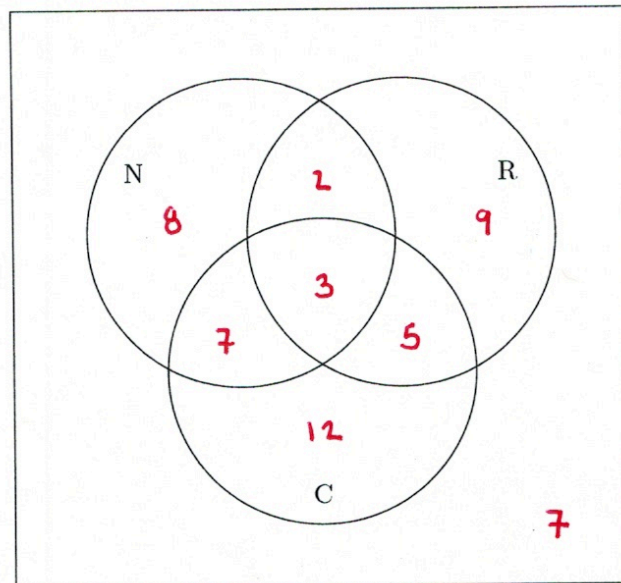
**$\{1, 3, 4, 5, 6, 7, 8, 9\}$**

(g) (6 points) List all possible subsets of  $C = \{a, b, c\}$ .

**$\emptyset$     $\{a\}$     $\{a, b\}$     $\{a, b, c\}$   
 $\{b\}$     $\{a, c\}$   
 $\{c\}$     $\{b, c\}$**

2. A telephone survey of TV viewers asked participants whether or not they watch news shows ( $N$ ), reality shows ( $R$ ), and/or comedies ( $C$ ). The results are listed below.

- 20 watch news shows
- 19 watch reality shows
- 27 watch comedies
- 19 watch comedies but not reality shows
- 15 watch news shows but not reality shows
- 10 watch both news shows and comedies
- 3 watch all three
- 7 watch none of these



(a) (6 points) How many TV viewers participated in this survey?

$$n(U) = 53$$

(b) (6 points) How many TV viewers watch only comedies?

$$n(C \cap N' \cap R') = 12$$

(c) (6 points) How many TV viewers do not watch comedies?

$$n(C') = 26$$

