

(1) [6] Suppose

$$U = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}, \quad A = \{0, 1, 5, 7\}, \quad B = \{0, 2, 3, 5, 8\}, \quad C = \{5, 6, 8, 9\}$$

(i) Determine $A \cup (B \cap A)$

(ii) Determine $(C \cap A) \cap (\bar{A})$

(iii) Determine $\bar{A} \cap \bar{B}$

(2) [4] The user names for a computer network consist of four uppercase letters selected from $\{A, B, C, \dots, Z\}$ followed by four digits selected from $\{0, 1, 2, \dots, 9\}$. How many possible user names have no matching adjacent letters or digits?

(3) [5] 250 fitness club members are surveyed to determine the type of equipment they use regularly. 170 replied that they use an exercise bike regularly, 119 said they use a stair stepper machine regularly, and 67 said they use both regularly. How many of those surveyed use neither of the machines regularly?