

(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 $\overline{A \cap B}$

$$A \cap B = \{0, 5\},$$

$$\text{So } \overline{A \cap B} = \{1, 2, 3, 4, 6, 7, 8, 9\}$$

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

$$C \cap A = \{5\},$$

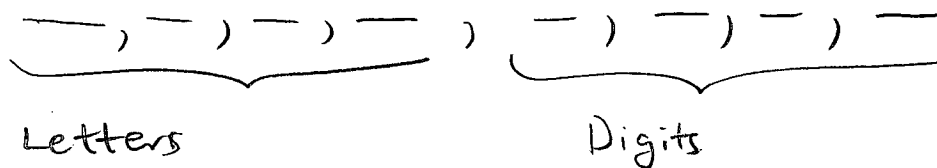
$$\text{So } (C \cap A) \cap \overline{A} = \emptyset$$

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

$$B \cap A = \{0, 5\}$$

$$\text{So } A \cup (B \cap A) = \{0, 1, 5, 7\}$$

(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 user names have no repeated letters or digits?



For the letters there are $(26)(25)(24)(23)$ choices

For the digits there are $(10)(9)(8)(7)$ choices.

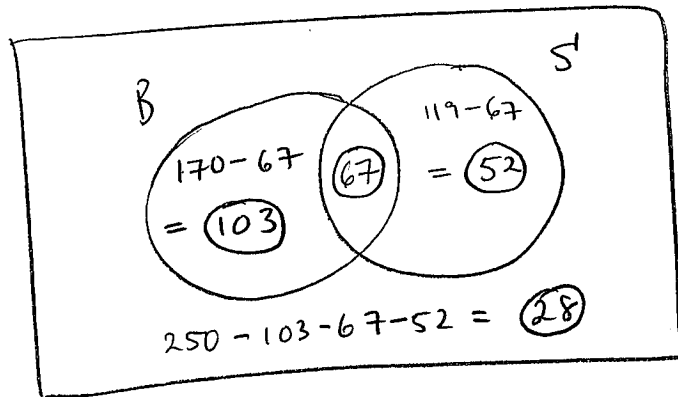
\therefore Total number of user names is

$$(26)(25)(24)(23)(10)(9)(8)(7) = 1,808,352,000$$

(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?

B: bike

S: stair machine



\therefore 28 use neither of the machines regularly.