Worksheet 1 Review

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Question 1

a. $A^c = \{1, 3, 4, 6\}$

b. $A = U \setminus A$

c. $A^c \cap B^c = \{x \mid x \in U,\ x \leq 0 \text{ and } x \geq 4\}$
$A^c \cup B^c = \{x \mid x \in U,\ x < 1 \text{ and } x > 2\}$
$(A \cap B)^c = \{x \mid x \in U,\ x < 1 \text{ and } x > 2\}$
$(A \cup B)^c = \{x \mid x \in U,\ x \leq 0 \text{ and } x \geq 4\}$

Correct Solution:

$A^c \cap B^c = \{x \mid x \in U,\ x \leq 0 \text{ or } x \geq 4\}$
$A^c \cup B^c = \{x \mid x \in U,\ x < 1 \text{ or } x > 2\}$
$(A \cap B)^c = \{x \mid x \in U,\ x < 1 \text{ or } x > 2\}$
$(A \cup B)^c = \{x \mid x \in U,\ x \leq 0 \text{ or } x \geq 4\}$
It follows from above that $A^c \cap B^c = (A \cup B)^c$ and $A^c \cup B^c = (A \cap B)^c$

Question 2

a. $T_0 = \{3, 6, 9, \dots\}$
$T_1 = \{1, 4, 7, \dots\}$
$T_2 = \{2, 5, 8, \dots\}$
$T_3 = \{6, 12, 18, \dots\}$

b. A partition of $\mathbb{Z}$ is $\{T_0, T_1, T2\}$.

All four sets can't be used because elements in T_3 overlaps with T_0. A partition cannot have any elements in common.

Question 3

Question 4