Worksheet 1 Solution

March 8, 2020

Question 1

a) $\mathrm{A} = \{\, 2,\, 5 \,\}$
$A^c = \{\, 1,\, 3,\, 4,\, 6 \,\}$

b) $A^c = U \setminus A$

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

Question 2

a) $T_0 \to 0, 3, 6$
$T_1 \to 1, 4, 7$
$T_2 \to 2, 5, 8$
$T_3 \to 12, 18, 24$

b) $\mathbb{Z}^+ = \{\, T_0, T_1, T_2 \,\}$

T_3 not included. A partition of a set must not have any common elements.

Question 3

a) 000, 110,
001, 010,
011, 100,
101, 111

b) $S_1 = \{$ aa,bb,cc,ab,ca,ba,ac,bc,cb $\}$

$S_2 = \{$ a,b,c,aa,bb,cc,ab,ca,aaa,aba,aca,bab,bbb,bcb,cac,cbc,ccc... $\}$

$S_1 \cap S_2 = \{ ca, ba, ac, bc, cb \}$

$S_1 \setminus S_2 = \{ ca, ba, ac, bc, cb \}$