Homework 2 – Solutions

1.20. (recommended) $\cup_{X\in S}X = \{0,1,2,3,4,5\},\ \cap_{X\in S}X = \{2\}$

1.24. (a) $A_n = \left[0, \frac{1}{n}\right]$, $n \in \mathbb{N}$

1.26. $S = \{X, Y, Z\}$ where $X = \{1,2\}$, $Y = \{3,4,5\}$, $Z = \{6\}$

1.28. (a) $(A \cup B) - (B \cap C) = \{1,2\}$ (b) $\overline{A} = \{3\}$ (c) $\overline{B \cup C} = \emptyset$, (d) $A \times B = \{(1,2),(1,3),(2,2),(2,3)\}$

add. quest. (a) True statement

(b) False statement

(c) Not a statement

(d) Not a statement

(e) A statement, but I don't know its truth value

(f) True statement (or may be it is false for you)

(g) Not a statement

2.8.

P	Q	$\neg Q$	$P \wedge (\neg Q)$
T	T	F	F
T	F	T	T
F	T	F	F
F	F	T	F

2.10.

P	Q	$P \Rightarrow Q$	$\neg P$	$(P \Rightarrow Q) \Rightarrow \neg P$
T	T	T	F	F
T	F	F	F	T
F	T	T	T	T
F	F	T	T	T

2.12. Since $(Q \vee R) \Rightarrow \neg P$ is false, $Q \vee R$ is true and $\neg P$ is false. It follows that P is true. Also, $Q \vee R$ is true and Q is false imply that R is true.

Note: problems 1.24 and 1.26 admit other correct answers. An alternative way to solve problem 2.12 is to construct a truth table and observe that only one case satisfies the given conditions.