

1. (12 points) (a) Give an example of three sets A, B and C each with **2 elements** such that

$$A \neq B \text{ and } A - C = B - C.$$

(b) Let $R = \{\emptyset, \{\emptyset\}\}$. Determine $\mathcal{P}(R)$ and $\mathcal{P}(R) - R$, where $\mathcal{P}(R)$ is the power set of R .

Solution. (a) Let $A = \{1, 2\}$, $B = \{1, 3\}$, $C = \{2, 3\}$. Then $A - C = \{1\} = B - C$.

(b) $\mathcal{P}(R) = \{\phi, R, \{\emptyset\}, \{\{\emptyset\}\}\}$. So, $\mathcal{P}(R) - R = \{R, \{\{\emptyset\}\}\}$.

2. (8 points) Show that $\sim (P \vee Q)$ and $(\sim P) \vee (\sim Q)$ have different truth tables.

(We see that the two statements are not logically equivalent.)

P	Q	$P \vee Q$	$\sim (P \vee Q)$	$\sim P$	$\sim Q$	$(\sim P) \vee (\sim Q)$
T	T	T	F	F	F	F
T	F	T	F	F	T	T
F	T	T	F	T	F	T
F	F	F	T	T	T	T