EXERCISES OF WEEK TWO

Exercise 1 ((c), ex. 4, **EXERCISES 1.1**, page 25 of [Pin71])**.** If the sentence is true, show it with a truth table. If it is false, give an example. For instance

$$P \vee Q \Rightarrow Q$$

is false when P is true and Q is false, $P \vee Q$ is true and Q is false.

(a) $P \wedge Q \Rightarrow Q$
(b) $Q \Rightarrow P \vee Q$
(c) $Q \Rightarrow P \wedge Q$
(d) $(P \Rightarrow Q) \Leftrightarrow (\neg Q \Rightarrow \neg P)$

Solution.

(a)

P	Q	$P \wedge Q$	$P \wedge Q \Rightarrow Q$
T	T	T	T
T	F	F	T
F	T	F	T
F	F	F	T

(b)

P	Q	$P \vee Q$	$Q \Rightarrow P \vee Q$
T	T	T	T
T	F	T	T
F	T	T	T
F	F	F	T

(c) it is false; for example, if Q is true and P is false, then $P \wedge Q$ is false. So $Q \Rightarrow P \wedge Q$ is false

(d)

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

□

Exercise 2. In the following

Date: 2014, March 23.

	X	Y	Z	T
X	0	0	0	0
Y	1	0	0	1
Z	0	1	0	1
T	0	0	0	0

What are

(a) sets
(b) proper classes
(c) the class $\{x \mid x \notin x\}$?

Solution.

(a) Y, Z
(b) X, T
(c) T.

□

REFERENCES

Pin71. Charles C. Pinter. *Set theory*. Addison-Wesley Publishing Co., Reading, Mass.-London-Don Mills, Ont., 1971.