NON-GRADED EXERCISES

Solve the following exercises from Rosen [1] Sec. 1.2, p. 26:
Exercises 7, 8, 9, 10, 14, 15, 16, 21, 22, 23.

EASY EXERCISES OF PROPOSITIONAL CALCULUS

Exercise 1. Determine which of the following are *propositions*. Explain why.

(1) Max is walking in the street.
(2) All sidewalks are in the street.
(3) Alice A, born on 1 of January 1900, with Social Security number 123 45 6789, is in New York.
(4) $x \in \mathbb{N}$
(5) $1 < 4$
(6) $4 < 1$
(7) All natural numbers are integers.
(8) Some natural numbers are negative.
(9) Which number is neither positive nor negative?
(10) There exists a number that is neither positive nor negative.

Exercise 2. Let P, Q and R be propositions. Determine the *truth tables* of the following propositions.

(1) $P \implies Q$
(2) $\neg P \vee Q$
(3) $\neg P \vee Q \wedge (P \vee Q)$
(4) $P \wedge Q \vee R$
(5) $P \wedge (Q \vee R)$
(6) $(P \wedge Q) \vee R$
(7) $\neg Q \vee Q \wedge (P \vee Q)$
(8) $(\neg Q \vee Q) \wedge (P \vee Q)$

Exercise 3. Determine which pairs of propositions of Exercise 2, if any, are *logically equivalent*.

Exercise 4. Determine which, if any, of the propositions of Exercise 2 are *tautologies*?

REFERENCES

[1] K. H. Rosen. *Discrete Mathematics and Its Applications.* Mc Graw Hill, 5 edition, 2003.