Homework 1

188 200 Discrete Mathematics and Linear Algebra

Assigned: Sec 1: 10 June and Sec 2: 9 June
Due: in lecture — Sec 1: 19 June and Sec 2: 18 June

Section 1.1 : 5 b c d, 8 b c, 13, 15, 18, 20, 39, 44, 45

Problem 1: Show that $p \leftrightarrow q$ and $(p \wedge q) \vee (\neg p \wedge \neg q)$ are logically equivalent using logically equivalent properties learned in class.

Problem 2: Determine whether $(\neg q \wedge (p \rightarrow q) \rightarrow \neg p)$ is tautology using logically equivalent properties.

Section 1.3 : 9, 10, 22, 41, 43

Section 2.1 : 11 b c, 12 b, 28, 36

Problem 3 Let $P(x, y)$ be the statement "x hates y" where the domain is the set of all the people. Use quantifiers to express each of the following statements:

1. Everybody hates Kung.
2. Everybody hates somebody.
3. There is somebody whom everybody hates.
4. Nobody hates everybody.
5. There is somebody whom Boy dose not hate.
6. There is somebody whom no one hates.
7. There is exactly one person whom everyone hates.
8. There are exactly two person whom Noo hates.
9. Everyone does not hate himself or herself.
10. There is someone who hate everyone besides himself or herself.

Problem 4 Let $Q(x, y)$ be the statement "x+y = x-y". If the domain is the set of integers, what are the truth values of the following? Briefly describe your answer.

a) $Q(1, 1)$

b) $Q(2, 0)$

c) $\forall y\ Q(1, y)$

d) $\exists x\ Q(x, 2)$

e) $\exists x\ \exists y\ Q(x, y)$

f) $\forall x\ \exists y\ Q(x, y)$

g) $\exists y\ \forall x\ Q(x, y)$

h) $\forall y\ \exists x\ Q(x, y)$

i) $\forall x\ \forall y\ Q(x, y)$