CSCE 222 [503] Discrete Structures for Computing
Spring 2015 – Philip C. Ritchey

Problem Set 1

Due dates: Electronic submission of hw1.tex and hw1.pdf files of this homework is due on **1/29/2015 (Thursday) before 11:59 p.m.** on `http://ecampus.tamu.edu`. A signed paper copy of the pdf file is due on **1/30/2015 (Friday)** at the beginning of class.

Name: (Han Hong)

Resources. (All people, books, articles, web pages, etc. that have been consulted when producing this homework)

On my honor, as an Aggie, I have neither given nor received any unauthorized aid on any portion of the academic work included in this assignment. Furthermore, I have disclosed all resources (people, books, web sites, etc.) that have been used to prepare this homework.

Signature: _____

Problem 1. (10 points) Section 1.1, Exercise 6 on page 13

Solution.
a. T
b. T
c. F
d. F
e. T

Problem 2. (10 points) Section 1.1, Exercise 10 on page 13

Solution.
a. The election is not decided.
b. The election is decided or the votes have been counted.
c. The election is not decided and the vote have been counted.
d. If the votes have been counted then the election is decided.
e. If the votes have not been counted then the election is not decided.
f. If the election is not decided then the vote have not been counted.
g. The election is decided if and only if the votes have been counted.
h. The votes have not been counted or, the election is not decided and the votes have been counted.

Problem 3. (10 points) Section 1.1, Exercise 14 on pages 13–14

Solution.
a. $r \wedge \neg q$
b. $p \wedge q \wedge r$
c. $r \rightarrow p$
d. $(p \wedge \neg q) \rightarrow r$
e. $(p \wedge q) \rightarrow r$
f. $r \leftrightarrow (p \vee q)$

Problem 4. (10 points) Section 1.1, Exercise 32 e) and f) on page 15

Solution.
e.

q	p	$q \rightarrow \neg p$	$p \leftrightarrow q$	$(q \rightarrow \neg p) \leftrightarrow (p \leftrightarrow q)$
0	0	1	1	1
0	1	1	0	0
1	0	1	0	0
1	1	0	1	0

f.

p	q	$p \leftrightarrow q$	$p \leftrightarrow \neg q$	$(p \leftrightarrow q) \oplus (p \leftrightarrow \neg q)$
0	0	1	0	1
0	1	0	1	1
1	0	0	1	1
1	1	1	0	1

Problem 5. (10 points) Section 1.2, Exercise 20 on page 23

Solution.
B is knight A is knave

Problem 6. (10 points) Section 1.2, Exercise 28 on page 23

Solution.
1st Possible solution:
A is a knight
B is a knave
C is a spy
2nd Possible solution:
A is a knave
B is a knight
C is a spy
3rd Possible solution:
A is a spy
B is a knight
C is knave

Problem 7. (5 points) Section 1.3, Exercise 10 (d), page 35

Solution.

p	q	r	$p \vee q$	$p \to r$	$q \to r$	$((p \vee q) \wedge (p \to r) \wedge (q \to r)) \to r$
0	0	0	0	1	1	1
0	0	1	0	1	1	1
0	1	0	1	1	0	1
0	1	1	1	1	1	1
1	0	0	1	0	1	1
1	0	1	1	0	1	1
1	1	0	1	1	0	1
1	1	1	1	1	1	1

Problem 8. (15 points) Section 1.3, Exercise 50, page 36 (find the definition of functionally complete on page 35).

Solution.
a. Let p is true
$p \downarrow p$ must be false
$\neg p$ is false
Let p is false
$p \downarrow p$must be true
$\neg p$is true
b.

Problem 9. (10 points) Section 1.4, Exercise 32, page 55

Solution.
a. $\forall p$
$\exists p$ Some dogs have fleas
b. $\exists q$
$\neg\forall$ q No horses can add
c. $\forall r$
$\exists r$Some kola can climb
d. $\neg\forall t$
$\forall t$ All monkey can speak French
e. $\exists v$
$\neg\forall v$ There are no pig that can swim and catch fish

Problem 10. (10 points) Section 1.5, Exercise 6, pages 64–65

Solution.
a. Randy Goldberg enrolled in CS 252
b. Some student enrolled in Math 695
c. Carol Sitea enrolled in some courses
d. Some student enrolled in Math 222 and CS 252
e. No solution
f. No solution

Checklist:

1. Did you add your name?
2. Did you disclose all resources that you have used?
   (This includes all people, books, websites, etc. that you have consulted)
3. Did you sign that you followed the Aggie honor code?
4. Did you solve all problems?
5. Did you submit (a) your latex source file and (b) the resulting pdf file of your homework on eCampus?
6. Did you submit (c) a signed hardcopy of the pdf file in class?