EECS 203-1 - Homework 2
Exercises in Rosen,
page 12-14: 16 a-c, 18 a-b, 26, 40
page 19-20: 8 b-d, 12, 18, 26
page 33: 8 a-e

Total points = 60

16 (2pts each)

(a) If I remember to send you the address, then you must have sent me an e-mail message. (Alternatively: If you want me to remember to send you the address, you must send me an email message.)

(b) If you were born in the United States, then you are a citizen of this country.

(c) If you keep your textbook, then it will be a useful reference in your future courses.

18 (2pts each)

(a) You get an A in this course if and only if you learn how to solve discret mathematics problems.

(b) You read the newspaper every day if and only if you are informed.

26 (6pts)

p	q	r	s	p→q	(p→q)→r	((p→q)→r)→s
T	T	T	T	T	T	T
T	T	T	F	T	T	F
T	T	F	T	T	F	T
T	T	F	F	T	F	T
T	F	T	T	F	T	T
T	F	T	F	F	T	F
T	F	F	T	F	T	T
T	F	F	F	F	T	F
F	T	T	T	T	T	T
F	T	T	F	T	T	F
F	T	F	T	T	F	T
F	T	F	F	T	F	T
F	F	T	T	T	T	T
F	F	T	F	T	T	F
F	F	F	T	T	F	T
F	F	F	F	T	F	T

40 (8pts each)

Conditions are:

- K or H
- (R or V) and (not(R and V))
- A→R
- V↔K
- H→A and K

Technique is to list out the whole truth table and then eliminate all wrong possibilities according to the above 5 conditions. It is acceptable if logical argument is given.

V and K are in the chatting room and others are not.

8 (4pts each)

(b)

p	q	r	p→q	q→r	(p→q)⋀(q→r)	p→r	[(p→q)⋁q→r]→(p→r)
T	T	T	T	T	T	T	T
T	T	F	T	F	F	F	T
T	F	T	F	T	F	T	T
T	F	F	F	T	F	F	T
F	T	T	T	T	T	T	T
F	T	F	T	F	F	T	T
F	F	T	T	T	T	T	T
F	F	F	T	T	T	T	T

(c)

p	q	p→q	p⋀p→q	[p⋀p→q]→q
T	T	T	T	T
T	F	F	F	T
F	T	T	F	T
F	F	T	F	T

(d)

p	q	r	p$\bigvee$q	p$\rightarrow$r	q$\rightarrow$r	[(p$\bigvee$q)$\bigwedge$(p$\rightarrow$r)$\bigwedge$(q$\rightarrow$r)]	[(p$\bigvee$q)$\bigwedge$(p$\rightarrow$r)$\bigwedge$(q$\rightarrow$r)]$\rightarrow$r
T	T	T	T	T	T	T	T
T	T	F	T	F	F	F	T
T	F	T	T	T	T	T	T
T	F	F	T	F	T	F	T
F	T	T	T	T	T	T	T
F	T	F	T	T	F	F	T
F	F	T	F	T	T	F	T
F	F	F	F	T	T	F	T

12 (5pts)

($\neg$ p $\bigwedge$ (p $\rightarrow$ q))$\rightarrow$ $\neg$ q
= $\neg$ ($\neg$ p $\bigwedge$ (p $\rightarrow$ q))$\bigvee$ $\neg$ q
= (p $\bigvee$ $\neg$ (p$\rightarrow$ q))$\bigvee$ $\neg$ q
= (p $\bigvee$ $\neg$ ($\neg$ p$\bigvee$ q))$\bigvee$ $\neg$ q
= (p $\bigvee$ (p$\bigwedge$ $\neg$ q))$\bigvee$ $\neg$ q
= p$\bigvee$ $\neg$ q, not a tautology

18 (4pts)

p	q	p$\oplus$q	$\neg$(p$\oplus$q)	p$\leftrightarrow$q
T	T	F	T	T
T	F	T	F	F
F	T	T	F	F
F	F	F	T	T

26 (5pts)

Consider the case of 2 variables p and q.

p	q	conjunction of the variables or their negatives	unknown proposition
T	T	p$\bigwedge$q	F
T	F	p$\bigwedge\neg$q	T
F	T	$\neg$p$\bigwedge$q	F
F	F	$\neg$p$\bigwedge\neg$q	T

unknown proposition
= disjunction of conjunctions for which the unknown proposition is true.
= (2nd conjunction) $\bigvee$ (4th conjunction), in the case shown above
= (p$\bigwedge$q$\neg$) $\bigvee$ ($\neg$p$\bigwedge$q$\neg$)

This way of finding the DNF for a proposition applies to the case of n variables too.

8 (2pts each)

(a) Randy Goldberg is enrolled in CS 252.

(b) There is a student enrolled in Math 695

(c) Carol Sitea is enrolled in one class.

(d) There is a student enrolled in both Math 222 and CS 252.

(e) We can find a student such that for all the classes he is enrolled in, we can find another student that is enrolled in all the same classes. (PS: This does not mean that they are enrolled in all classes available. Also this does not mean that a class has at least 2 students if any. Also this does not mean that we can find 2 students that are taking EXACTLY the same set of classes.)