Assignment 2
Chapter 1
Bruno Kieszkowski

Section 1.2: Complete Exercises 3, 7, 11, 15, 21 on pages 23 - 24.

Q1) Translate the given statement into propositional logic using the propositions provided.
You can graduate only if you have completed the requirements of your major and you do not owe money to the university and you do not have an overdue library book.
Express your answer in terms of
g: “You can graduate,”
m: “You owe money to the university,”
r: “You have completed the requirements of your major,”
b: “You have an overdue library book.”

$r \wedge (\neg m \wedge \neg b) \rightarrow g$

Express these system specifications using the propositions
p: “The message is scanned for viruses”
q: “The message was sent from an unknown system” together with logical connectives (including negations).
“The message is scanned for viruses whenever the message was sent from an unknown system.”
$q \rightarrow p$

“The message was sent from an unknown system but it was not scanned for viruses.”
$q \wedge p$

“It is necessary to scan the message for viruses whenever it was sent from an unknown system.”
$q \rightarrow p$

“When a message is not sent from an unknown system it is not scanned for viruses.”
$\neg q \rightarrow \neg p$

Are these system specifications consistent?
"The router can send packets to the edge system only if it supports the new address space. For the router to support the new address space it is necessary that the latest software release be installed. The router can send packets to the edge system if the latest software release is installed. The router does not support the new address space."
I would say these are not specific because the first two are Exclusive Or saying only if while the third one is inclusive saying it can if a condition is met but not saying only if.

What Google search would you use to look for Web pages relating to Ethiopian restaurants in New York or New Jersey?

Ethiopian restaurant + New York + New Jersey

When three professors are seated in a restaurant, the hostess asks them: "Does everyone want coffee?" The first professor says "I do not know." The second professor then says "I do not know." Finally, the third professor says "No, not everyone wants coffee." The hostess comes back and gives coffee to the professors who want it. How did she figure out who wanted coffee?

She figured that the third professor wanted the coffee because the others said they didn't know and he said not everyone knew. This would imply he wants it because he didn't say no or I don't know.

Section 1.3: Complete Exercises 3, 7, 11, 15, 21 on pages 38 - 39.

Q1) Use truth tables to verify the commutative laws
$p \vee q \equiv q \vee p$.

p	q	p v q	q v p
T	T	T	T
T	F	T	T
F	T	T	T
F	F	F	F

$p \wedge q \equiv q \wedge p$.

p	q	$p \wedge q$	$q \wedge p$
T	T	T	T
T	F	F	F
F	T	F	F
F	F	F	F

They both have the same truth values

Q2) Use De Morgan's laws to find the negation of each of the following statements.

Jan is rich and happy.
Jan is not rich or unhappy

Carlos will bicycle or run tomorrow.
Carlos will not bicycle and not run tomorrow

Mei walks or takes the bus to class.
Mei does not walk and does not take the bus to class

Ibrahim is smart and hard working.
Ibrahim is not smart or not hard working

Q3) Show that each of these conditional statements is a tautology by using truth tables.

$(p \wedge q) \rightarrow p$

p	q	$p \wedge q$	$(p \wedge q) \rightarrow p$
T	T	T	T
T	F	F	T
F	T	F	T
F	F	F	T

$p \rightarrow (p \vee q)$

p	q	$p \vee q$	$p \rightarrow (p \vee q)$
F	F	F	T
F	T	T	T
T	F	T	T
T	T	T	T

$\neg p \rightarrow (p \rightarrow q)$

p	q	$\neg p$	$p \rightarrow q$	$\neg p \rightarrow (p \rightarrow q)$
F	F	T	T	T
F	T	T	T	T
T	F	F	F	T
T	T	F	T	T

$(p \wedge q) \rightarrow (p \rightarrow q)$

p	q	$p \wedge q$	$p \rightarrow q$	$(p \wedge q) \rightarrow (p \rightarrow q)$
F	F	F	T	T
F	T	F	T	T
T	F	F	F	T
T	T	T	T	T

$\neg(p \rightarrow q) \rightarrow p$

p	q	$p \rightarrow q$	$\neg(p \rightarrow q)$	$\neg(p \rightarrow q) \rightarrow p$
F	F	T	F	T
F	T	T	F	T
T	F	F	T	T
T	T	T	F	T

$\neg(p \rightarrow q) \rightarrow \neg q$

p	q	$p \rightarrow q$	$\neg(p \rightarrow q)$	$\neg q$	$\neg(p \rightarrow q) \rightarrow \neg q$
F	F	T	F	T	T
F	T	T	F	F	T
T	F	F	T	T	T
T	T	T	F	F	T

Q4) Show that each conditional statement in Q3 is a tautology using the fact that a conditional statement is false exactly when the hypothesis is true and the conclusion is false. (Do not use truth tables.)

I don’t know what to do