CSCI 301 M2 Homework

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Collaboration statement: *By submitting this assignment, I am attesting that this homework is in full compliance with the course's Homework Collaboration Policy and with all other relevant academic honesty policies of the course and university. I discussed this homework with* **no one**.

1. Indicate whether each of the items below are statements (using the book's definition of statement)
   (a) No, not a statement because there is no definite true or false. It is an open sentence.
   (b) Yes, because the statement is always definitely true.
   (c) Yes, I believe this is a definitely false statement but it still is a statement. It only takes one student who doesn't take CSCI to make the statement definitely false.
   (d) Yes, this is a statement because it could be definitely true or false.
   (e) Yes, this is a statement because it is definitely false.
   (f) No, this is not a statement because it could be true or false depending on the value of x. This is an open sentence.
2. Translate the following English statements into logical expressions.
   (a) $(P \vee Q) \to (Q \wedge R)$
   (b) $P \to \neg R$
   (c) $P \wedge (Q \vee R)$
   (d) $(P \wedge Q) \to R$
3. Construct truth tables for each of the following expressions:
   (a)

$\neg P$	Q	$P \to Q$
T	T	F
T	F	T
F	T	T
F	F	F

   (b)

P	Q	R	$P \to Q$	$(P \to Q) \vee R$
T	T	T	T	T
T	T	F	T	T
T	F	T	F	T
T	F	F	F	F
F	T	T	F	T
F	T	F	F	F
F	F	T	T	T
F	F	F	T	T

(c)

P	Q	R	$P \to Q$	$P \to R$	$(P \to Q) \wedge (P \to R)$
T	T	T	T	T	T
T	T	F	T	F	F
T	F	T	F	T	F
T	F	F	F	F	F
F	T	T	F	F	F
F	T	F	F	T	F
F	F	T	T	F	F
F	F	F	T	T	T

(d)

P	Q	R	$P \to Q$	$P \to R$	$(P \to Q) \leftrightarrow (P \to R)$
T	T	T	T	T	T
T	T	F	T	F	F
T	F	T	F	T	F
T	F	F	F	F	T
F	T	T	F	F	T
F	T	F	F	T	F
F	F	T	T	F	F
F	F	F	T	T	T

4. Which of the following is not equivalent to the others (show by truth table):

(a)

P	Q	$\neg(P \to Q)$	$P \wedge \neg Q$	$\neg(\neg P \vee Q)$	$\neg Q \to \neg P$
T	T	F	F	F	T
T	F	T	T	T	F
F	T	T	F	F	F
F	F	F	F	F	T

5. Translate the following into English statements:

   (a) Somebody teaches everybody.

   (b) Everybody is taught by somebody.

   (c) Everybody whom is a professor has at least one person whom they teach.

   (d) Everybody whom is not a professor gets taught by somebody.

6. Which of the following is not equivalent to the others (and explain why):

   (a) It is not true that everybody teaches everybody.

   (b) It is not true that somebody teaches somebody.

   (c) Somebody does not teach somebody.

   (d) Somebody does not teach somebody.

   'b', 'c', 'd' are all saying the same thing. They can all be written as "Somebody does not teach somebody and 'a' is written as "Everybody does not teach everybody".