HW 2: due Tuesday, January 31

Part I: From *Richmond and Richmond* do problems:

- Section 1.4 (pp. 32-34): 3abcd, 8ab, 12, 13.
- Section 1.6 (pp. 46-47): 1, 2be, 5ab, 6cdh, 7.

Part II:

Consider the following hypotheses: If I take the bus or the subway, then I will be late for my appointment. If I take a cab, then I will not be late for my appointment, and I will be broke. I will be on time for my appointment. Which conclusions must follow, i.e. can be inferred from the hypothesis? Justify your answers.

1. I will take a cab.
2. I will be broke
3. I will not take the subway
4. If I become broke, then I took a cab
5. If I take the bus, then I won’t be broke

Part III (challenging):

You’ve had a bunch of problems where, given a logical formula, you can write down the truth table. How about the reverse? That is, if I give you all possible variable settings for a truth table on \( k \) variables, and then I give you the values I want in the rightmost column, can you always come up with a formula that would give you exactly the values in that truth table? How might you do that?

This is hard enough that we are going to build up to it slowly, in order to try to get some intuition about what this question is asking:
1. Do Section 1.4, problem 10 in your text (where you are are asked to solve this problem in some specific cases by filling in the formulas marked “?”)

2. Suppose you restrict the question to truth tables with only 2 variables (you can call them $P$ and $Q$). Can you answer the question in this case?

3. Now write down a few examples with three variables (you can call them $P$, $Q$, and $R$, and try to do what you did for Section 1.4, problem 10 above.

4. Now: try to solve the full question for truth tables with $k$ variables.