Intro to Discrete Math Graded Problems

Important: Remember to read the instructions and advice in homework.html !

§ 2.1 (20 points)   Use Theorem 2.1.1 to fully simplify the logical expression below. Write a clear chain of equivalences, and justify each step by citing the law(s) used by name.

$$\sim[\sim[(p \lor q) \land r] \lor \sim q]$$

(Hint: The distributive law *can* be applied here, but it does not help! On the contrary, it will just make things harder for both of us. Look for another approach.)

§ 2.3 (20 points)   Write the following argument in symbolic form, then use a truth table to explain why the argument is valid. Provide a counterexample in plain English.

> If it is chilly this Saturday, then Lisa will wear her wool dress if the hem has been repaired. The forecast for the weekend calls for cool weather, but the hem has not been repaired. Therefore Lisa won't be wearing her wool dress this Saturday.

(Hint: The hardest part of this problem is probably the translation to a symbolic representation, so I strongly recommend checking with me to confirm that you've done that correctly before proceeding!)

§ 2.4 (10 points)   Design a circuit for the following I/O table, using only the three basic gate types NOT, AND, and/or OR.

The direct/standard approach, if done correctly, yields a circuit with five gates. For a bonus point, find a correct circuit that uses only *four* gates.

P	Q	R
0	0	1
0	1	0
1	0	0
1	1	1