Anna Karlin, 426C Sieg

Homework #1

Due at the beginning of class, Wednesday, April 8

Reading: Rosen, Sections 1.1– 1.4

Problems:

1. Attach a picture containing your current face to the upper right hand corner of the index card. Write your name in the upper left corner. On the remainder of the card, include any facts about yourself that you would care to share with me, especially those that will help me remember you.
2. Rosen, Section 1.1, problem 8, parts e and f.
3. Rosen, Section 1.1, problem 10.
4. Rosen, Section 1.1, problem 22, parts b and c.
5. Rosen, Section 1.1, problem 28.
6. (This problem came up in an interview at amazon.com). Show how to swap the contents of two n-bit registers using no extra storage. You're allowed to perform bit operations (bitwise OR, bitwise AND, bitwise XOR) on the current contents of the two registers and store the result in one of the registers, overwriting what was previously there. For example, if register 1 contains the n-bit value X and register 2 contains the n-bit value Y, you can perform the bitwise AND of X and Y, and store the result in register 1. The effect is that register 1 contains $X \wedge Y$ and register 2 contains Y.
7. Rosen, Section 1.2, problem 8, parts b and c.
8. Show that the following implication is a tautology by using truth tables:
$$[p \wedge q \wedge (p \rightarrow r)] \rightarrow (q \wedge r)$$
9. Rosen, Section 1.2, problem 14.
10. Find a compound proposition involving the atomic propositions p, q and r that is true exactly when *both*
    - at least one of the atomic propositions is true, *and also*
    - at least one of the atomic propositions is false.

    The compound proposition is false otherwise.
11. Rosen, Section 1.2, problem 28.