Discrete Structures CSE 321, Spring 1998	Anna Karlin, 426C Sieg

Homework #2

Due at the beginning of class, Wednesday, April 15

Reading: Rosen, Sections 1.4 – 1.6, pp 76–77, 3.1

Problems:

1. Rosen, Section 1.3, problem 6, parts a, and c.
2. Rosen, Section 1.3, problem 10, parts f, h, i and j. For each proposition, write down its negation.
3. Rosen, Section 1.3, problem 20. What is the universe of discourse?
4. Rosen, Section 1.3, problem 26. State an example of a situation where the two propositions are not equivalent (this is called a proof by *counterexample*). The situation should include a definition for $P(x)$ and $Q(x)$ as well as a universe of discourse.
5. State whether each of these is a proposition, a predicate (propositional function), or neither. (x and y are variables, and P and Q are predicates)
   (a) $\forall x\, P(x, y)$
   (b) $\exists x \exists y\, Q(x, y, y)$
   (c) $\forall y$
6. Rosen, Section 1.4, problem 2, parts a and b.
7. List the members of the set
$$\{x^2 + y^2 \mid x \in \{1, 2\} \wedge y \in \{1, 2\}\}.$$
8. What is the cardinality of
   (a) $\{a, \{a\}, \{\{a\}\}, \{a, b\}\}$
   (b) $P(\{a, b, \emptyset\})$
   (c) $P(P(\{a, b, c\}))$
9. Rosen, Section 1.4, problem 14.
10. If $A_1, A_2, \cdots A_n$ are sets and $|A_1| = a_1, |A_2| = a_2, \cdots |A_n| = a_n$, then what is the cardinality of
$$A_1 \times A_2 \times \cdots \times A_n?$$
(Something to think about: why is it called a Cartesian *product*?)