Math 331 Worksheet 3

Note: None of these problems are for a grade, though you may obtain extra credit for writing up proofs on the board.

1) Negate the following statements:

a) All dogs have four legs.

b) There was an old woman who lived in a shoe.

c) If it is raining, then the sun is not shining.

2) Form the converse and contrapositive of the following statements, then see whether you can prove or disprove the converse.

a) If $m > 2$ is an even integer, then m is the sum of two odd primes (Goldbach's Conjecture- you get an A in the course if you can prove this).

b) If lines l and m are distinct lines that have a unique point in common, then l and m are not parallel.

3) In the text, you will find a proof that $\sqrt{2}$ is irrational. Make sure everyone in your group understands this proof. Can you generalize the proof to show that $\sqrt{12}$ is irrational?

4) Determine whether the following are models for incidence geometry.

a) "Lines" are three-element subsets of the set $S = \{1, 2, 3, 4, 5\}$. "Points" are two-element subsets of S, "incidence" means subset inclusion.

b) "Points" are lines in Euclidean 3-space, "lines" are planes in Euclidean 3-space, "incidence" means the line is contained in the plane.