Exercises — Syllogisms

Presentation Problems:

1. Find two examples of the "resolution" syllogism in the play. The conclusions should be disjunctions of terms which are not negated. Identify the propositions in each case, and represent the syllogism symbolically.

2. Identify two instances of modus tollens in today's play.

3. Identify an instance of hypothetical syllogism in today's play.

4. Suppose that $P \rightarrow Q$, $Q \rightarrow R$ and $R \rightarrow S$ are all true. What assertion about S would lead us to conclude that P is false? How do you prove your claim?

5. Assuming that $\neg A \rightarrow B$, $B \rightarrow (C \rightarrow D)$ and $E \rightarrow \neg B$ are all true, show that $E \rightarrow (C \rightarrow D)$ is true, or find values for each of the variables so that the premises are true but the conclusion is false.

6. Assuming that $(A \rightarrow B) \rightarrow C$, $D \rightarrow E$, $\neg D \rightarrow \neg C$ and $\neg E$ are all true, show that $\neg(A \rightarrow E)$ is true.

7. Assume that "If I love you, then I will give you flowers" is true. Which of the following must also be true:
   a. If I give you flowers, then I love you.
   b. If I don't give you flowers, then I don't love you.
   c. If I don't love you, then I don't give you flowers.
   If you say that an assertion must be true, justify your answer. If not, explain circumstances under which the assertion might be false.

Extension Problem:

Here are some axioms of geometry:

- A straight line segment can be drawn joining any two points.
- Any straight line segment can be extended indefinitely in a straight line.
- Given any straight line segment, a circle can be drawn having the segment as radius and one endpoint as center.
- All right angles are congruent.
- If two lines are drawn which intersect a third in such a way that the sum of the inner angles on one side is less than two right angles, then the two lines inevitably must intersect each other on that side if extended far enough.

8. Use these to prove that it is possible to construct an equilateral triangle given a segment which is one of its sides.

9. Prove that given two lines *l* and *m* which intersect at point A, and another point B on *l*, that it is possible to construct a third line through B which makes the same angle with *l* as *m* does.