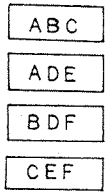
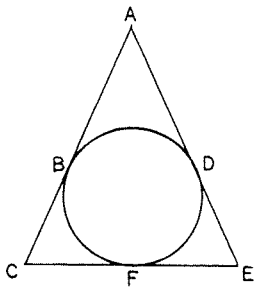
A picture drawn according to the rules of a system is called a model of the system. System 1 has at least two models:



Model 1



Model 2

Model 1 uses rectangles for committees and letters for members. Model 2 suggests the possibility of using "points" and "lines" instead of "members" and "committees."

Exercise 1-3 In the space below, rewrite the three rules of System 1, replacing the word "member" with the word "point" and the word "committee" with the words "straight line."

An important question now arises. Is the line in model 2 which contains the points B, D, and F a "straight" line? It may seem strange but the answer is yes! A model doesn't have to agree with our preconceived notions about straightness or in general with our past experience. A model of a system only has to agree with the rules of that system! We will return to this idea later. (Models 1 and 2 above are not the only possible models of this system.)

An existence rule for a system is a rule that states unconditionally that an object exists.

Exercise 1-4 Only one of the rules of System 1 is an existence rule. Which one?

When using the rules, the best sequence is to find the existence rule(s), then look for those rules whose subject (in the grammatical sense) is the same as the "things" that the existence rule says exist. For example in this system, start with rule 3, then use rule 1. (I take the subject of a sentence in the broad sense, that is, the subject is everything that comes before the verb and the predicate everything that comes after. This is true often enough to be convenient. Grammarians, forgive!)

We have two models of System 1 (or perhaps two versions of the same model) with a total of six members--that is, three members on each committee. How can we be sure that there isn't another model with more than six members which also fits the rules of System 1? The following exercises attempt to deal with this question.

Exercise 1-5 Explain why there cannot be just five members. (Hint: Eliminate someone from model 1, then see what happens.)

Exercise 1-6 Explain why there cannot be seven members. (Hint: Add someone to model 1, then see what happens.)

You have just been studying a deductive system. A deductive system is a set of basic rules (called axioms) and the collection of all statements which can be deduced from the basic rules.

Exercise 1-7 List some statements which are true in System 1 but which are not axioms.