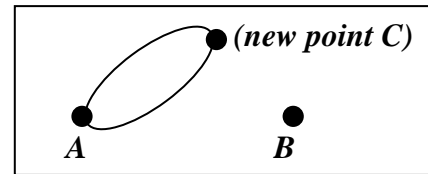
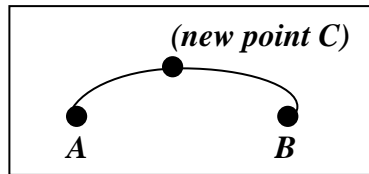


## Basic Geometric Concepts - “Sprouts”

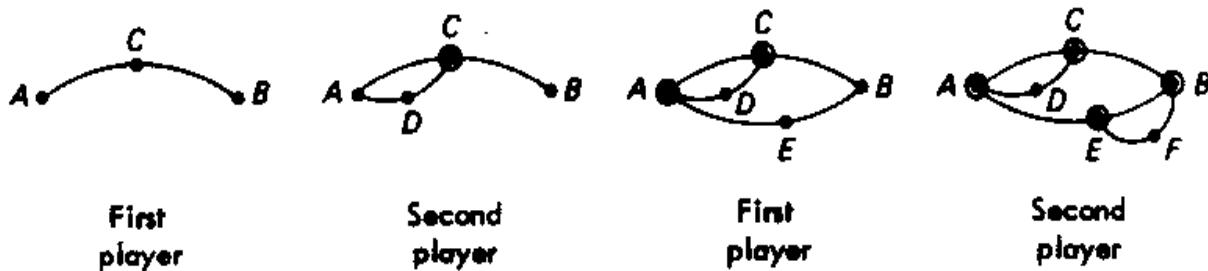
*Rules for playing the game of “Sprouts”.* The game starts with two points, labeled A and B in the diagram below. Each player takes a turn drawing an arc from one point to another, or back to the same point, and then places a new point on the arc drawn. Shown below are two possible moves that the first player might make...



*The two basic rules of play are...*

1. No arc may cross itself or another arc, nor may it pass through a point.
2. No point may have more than three arcs coming into it.

Shown below is a sample game that was played. A large circle around a point indicates that it is out of play, since there are three arcs coming into it.



In the game illustrated above, the second player wins. The first player cannot draw an arc from D to F because it would pass through arc EB. Also, there is no way to draw an arc from D to itself or from F to itself, because there would then be four arcs coming into that point. **Play several games of “Sprouts”, and then answer each of the following questions in your notebook.**

- [1] After playing several times, do you notice anything peculiar about this game? Write a short paragraph that explains how this game works, and what is peculiar about it.
- [2] Are there any **winning strategies** for this game that you could suggest for the first player? Would they be different for the second player? Explain how and why.
- [3] Try playing this game **starting with three spots** instead of two. How does this alter the game, and the strategies you discussed in problem [2]?
- [4] What is the **maximum** possible number of moves if you start with two spots? What if you start with three spots?
- [5] Suppose the rules of the game were changed, so that no spot could have more than **four arcs** pass through it (instead of three). How would this alter the game?