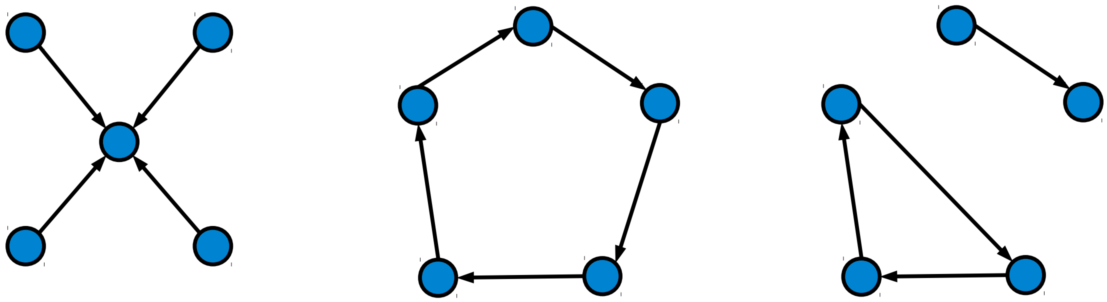
1. Consider the last model that we discussed. Here one person pays to make a connection to someone else, but information flows in both directions. Suppose there are no errors, all information is transmitted perfectly second hand (and third hand, and fourth hand). Suppose that each piece of information is worth 1 and the cost is *c*. Use these graphs, where the arrow points to the person who is paying, but information flows in both directions:



(a) For each graph, calculate the payoffs for each player in the graph.

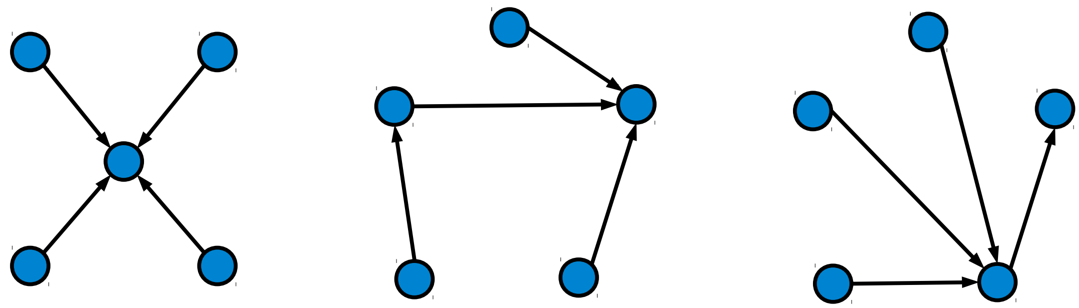
(b) For each graph, calculate the sum of the payoffs for all players in the graph. Which graph is best for players as a group? Which is second best? Which is third best? Does it depend on the value of *c*?

(c) Suppose that $c < 1$. For each graph, is there any player that would want to change how they connect to others, either by adding connections, dropping connections, or both?

(d) Which are stable if $c > 1$?

(e) Look at your answer to part (b) and part (d). Is there ever a case where the network that is best for the group is not stable? What do you make of this?

2. Keep considering the same model as before. Let's compare these networks which are all “minimally connected.” That means that if any edge was removed there would two groups that would be isolated from one another.



(a) For each graph, calculate the payoffs for each player.

(b) For each graph, calculate the sum of the payoffs for all players in the graph. Which graph is best for players as a group? Which is second best? Which is third best? Does it depend on the value of *c*?

(c) Suppose that $c < 1$. For each graph, is there any player that would want to change how they connect to others, either by adding connections, dropping connections, or both?

(d) Which are stable if $c > 1$?

(e) Can you draw any general conclusions from this? Could you prove something about the properties of any minimally connected network?