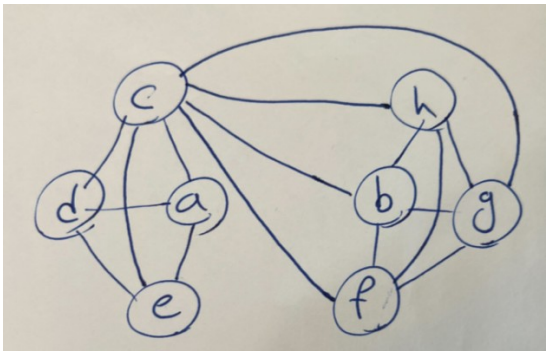
HW2 Amin Majdi ID = 01924731

Problem #1:

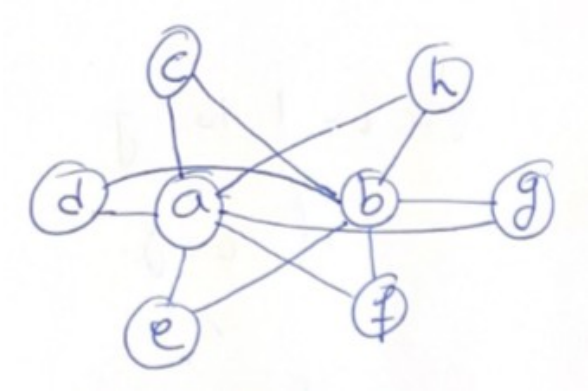
1-

Cf_a = 3/3=1
Cf_b = 6/6=1
No_ab =1/6



2-

CF_a = 0/15=0
CF_b = 0/15=0
NO_ab = 6/6 = 1



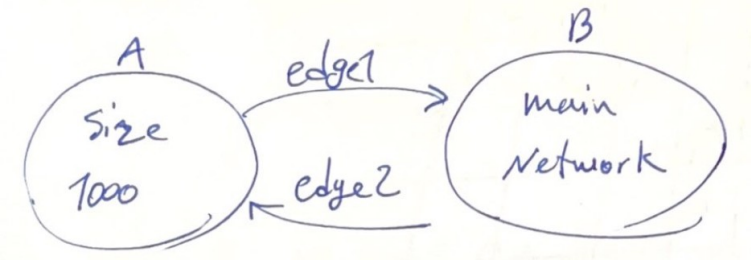
Problem #2:

1-The label should be "W", because b and c have No strong common tie. More importantly, if the connection is strong, there should be a "w" connection between "b" and "f" and "c" and "e" as well.

2-Strong connections can make new connections, ether W or S, but a big network will be very dependent on W connections. Although Strong connections, Can make friendships between immediate friends, weak connections are more pivotal for having a large network. week ties can connect different small communities and creat big networks

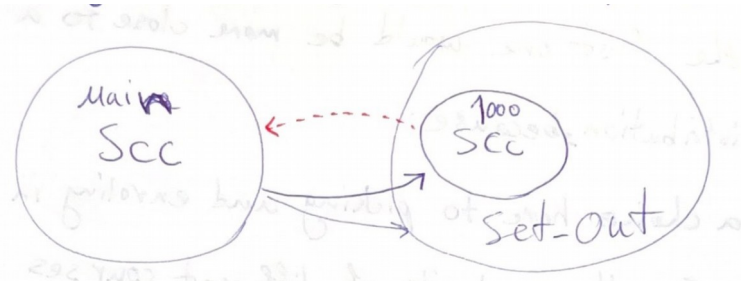
Problem #3:

1-Imagine we have a network like this:



In this example, part of the network with size 1000 is connected to the main network through two edges and makes a bigger SCC. By eliminating edge 1, A and B can not be part of a big SCC anymore because there is no path from A to B anymore, and nodes in A can not reach the nodes in B.

2-Imagine we have a network like this:



In this network, we have an SCC, which is the main and another SCC size 1000 in the set-out portion of the network. By creating a connection (like the red connection in the graph) from the small SCC to the main SCC, we can attach the small SCC to the main SCC, and this way, the size of the set-out portion will shrink by 1000.

Problem #4:
I believe the first one would be more close to a power-law distribution because:
1- There is a choice here for the students to enroll in the classes. So, the popularity of different courses can affect the number of enrolments in a class. On the other hand, all the classes in the 3rd-grade are the same, and there is no difference between them.
2- Students in the university can pick multiple classes while pupils only can take part in one class. So, the classes in the university can be seen as a network, and the students can connect these classes. So, there can be many classes with e few participants and e few classes with a very high number of students. So it can be seen as a power law .

Problem #5:
1- The Rich-Get-Richer phenomenon is based on previous knowledge that somebody is already rich and may get richer at each step. In this experiment, the connections are random in each step. So, it is not following the previous knowledge, and I expect they did not observe the RGR in their dataset. Rich has the same chance to be richer as others in this experiment.

2- On the other hand, the power law is likely to be seen in these graphs. Because in the end, the number of nods with a small number of connections will be much higher than those with a big number of connections. So, there will be a f=a/k^c function to fit this behavior.