Assignment 2: Hubs and foci
Sociology 204: Social Networks
Due: Wednesday, February 20, 2013
Remember to write your name and precept time on your assignment and staple it!

1) Barabasi and colleagues have claimed that most networks have "scale-free" degree distributions. It is the case, for example, that Hartsfield-Jackson Airport in Atlanta had almost 1,000,000 take-offs or landings in 2007. This is certainly thousands of times more flights than smaller airports like Ithaca, NY. But, is the human acquaintanceship network "scale-free"? Do there seem to be similar "hubs"? We will use the data that has already been collected by Facebook to try to decide. [If you don't have a Facebook account please use a friend's account.]

a) How many friends do you have on Facebook?

b) Now pick 10 of your friends on Facebook who you think **have the most friends**. How many friends does each of them have?

c) Do any of them have twice as many friends as you? 10 times as many friends? 100 times as many friends? What does this suggest about the existence of "hubs" in the acquaintanceship networks?

d) Are there reasons to be skeptical about the results of this exercise? Why or why not?

2) Now let's look at a different network: Twitter. According to this blog post from *The Guardian* (http://www.guardian.co.uk/technology/blog/2009/jun/29/twitter-users-average-api-traffic), the average Twitter account has 126 followers. Assume that this is still true today. Now visit http://twitaholic.com/ and see the number of followers for the 10 most popular people on twitter.

a) What does this suggest about whether the Twitter network is scale-free? Use data to support your answer.

b) If there is a difference between Twitter and Facebook, what might explain this difference about the way ties are formed on each website?

3) Feld (1981) called attention to the extra-network bases for friendship ties and defined a focus as a "social, psychological, legal, or physical entity around which joint activities are organized." For example, a soccer team and a dorm are both foci.

a) What do you think are the 3 most important foci for your own friendship network?

For question 3b there are two options, please try the main option with visualizing your Facebook network. However, if you do not have Facebook or cannot make the visualization for some reason, please complete question 3b[alt].

3b) Now we are going to visualize your Facebook network and see if we can observe the effects of these foci on your personal network. To make the visualization we are going to use netvizz and Gephi, a open-source network analysis program. For more background on this process, you can see:
http://www.slideshare.net/persuasion/facebook-network-analysis-using-gephi-11390089

NOTE: This process might not work for you. For example, if you do not have a computer where you can install gephi then you will not be able to complete this assignment. Therefore, if you are unable to complete question 3b, then you can do 3b[alt] listed below.

To make a visualization of your personal Facebook network, please follow these steps (see this blog post for screenshots of the different steps:
https://msalganik.wordpress.com/2013/02/11/visualizing-your-facebook-network/):
  1) Go to https://apps.facebook.com/netvizz/.
  2) On step 2 click to create a gdf file from your personal network. Note, please do not check the box that says ("friends' like and post count"); this makes the process take a very long time. Even still, it might take A LONG TIME for netvizz to complete its work. Be patient. Save this gdf file somewhere where you can find it; this .gdf file has the data about your personal network on Facebook.
  3) Install Gephi. It is open source and runs on Windows, Mac, and Linux machines.
  4) Open Gephi.
  5) In Gephi, open the .gdf file that you just created.
  6) In the "import report" window change "directed" to "undirected"
  7) Change the Layout to "Fruchterman Reingold" and press run. Once the layout stops changing you can press stop.
  8) Click on the "T" at the bottom of the screen to add labels.
  9) Explore the visualization by adjusting the sliders to change edge thickness and label size. You can also roll over specific points to highlight subsets of edges.
  10) Make any additional changes to the graph that you want (feel free to be creative) and then export it. To do this, click on the preview button at the top of the screen. Select the options that you want and then click the "Export SVG/PDF/PNG" button on the lower right part of the screen.

Write a short summary of the patterns that you see. How does this relate to the ideas in Feld (1981)? Be specific. Be sure to include a copy of your visualization.

3b[alt]) If question 3b is not possible for you for some reason, write a one page summary of the force directed graph drawing algorithms and why they might cause your personal network to automatically divide into communities that are driven by foci. Note that we have not read anything about force directed graph drawing so you will need to do a bit of your own research to answer this question.