1. If you were to change the course what one thing would you change?
2. Generate a 1000 by 1000 random symmetric matrix. Use $p=1 / 2$ for probability of an edge. Plot the eigenvalues of the matrix.
3. If the probability distribution of the eigenvalues is semicircular, what is the shape of the plot of size of eigenvalue versus rank of eigenvalue, i.e., a plot of $\lambda_{1}, \lambda_{2}, \cdots$ ?
Superimpose the theoretic shape over the actual plot in 1.
4. Consider a growth model for a random graph where at each time unit a vertex and an edge are added. For one end of the edge select a vertex uniformly at random and for the other end select a vertex with probability proportional to its degree. Use a computer program to get a sense of the connectivity of the graph. What is the distribution of component sizes? What is the degree distribution? Does it appear to obey a power law?
