Social and Technological Networks Edinburgh, 2019

Notes 2.

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Q 1. *Programming: Take a set of n nodes, where you choose n. Now create the plot for ER graphs where p is along x axis, and the probability of there being an isolated vertex is along y axis. Think carefully about what you need to do to get the "probability", and what value of n is reasonable. (You are not expected have a rigorous answer for this, but a very small n will not give reliable results, but a large n will make the program slow.)*

Q 2. *Show that a connected graph has $\Omega(n)$ triads (counting both open and closed).*

In class we saw that a triangle or closed triad is is three vertices a, b, c with all edges ab, bc, ca between them. The number of possible triangles or triads is clearly $\binom{n}{3}$, which is $\Theta(n^3)$. The probability that a particular triangle exists is p^3.

Q 3. *What is the expected number of triangles or closed triads in the graph?*

Q 4. *Clustering coefficient is the ratio of number of closed triads to number of all triads. Show that for ER graphs with $p = \frac{\ln n}{n}$ (where n is an unknown variable) the clustering coefficient cannot be bounded from below buy a constant. (That is, there is no constant number such that CC is always greater than that.)*