Social*Networks

Home Work #3

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7 April 2015 [Due in 2 weeks: April 21 2015]

Q1. [5] Exercise #1 In $G(n,p)$ the probability of a vertex having degree k is

$$\binom{n}{k} p^k (1-p)^{n-k}.$$

Show by direct calculation that the expected degree is np. Where is the mode of the binomial distribution? [Mode is the point at which the probability is maximum.] Compute directly the variance of the distribution.

Q2. [5] In $G(n, \frac{1}{n})$ what is the probability that there is a vertex of degree $\log n$? Give an exact formula; also derive simple approximations.

Q3. [10] What is the expected number of triangles and squares (3-cycles & 4-cycles) in $G(n, \frac{d}{n})$? What is the expected number of 4-cliques in $G(n, \frac{d}{n})$?