Homework 4

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1

$$
\begin{aligned}
C_a = \frac{2 * d_a}{m_a * (m_a - 1)} &= \frac{2 * 3}{4 * (4 - 1)} = \frac{1}{2} \\
C_b = \frac{2 * d_b}{m_b * (m_b - 1)} &= \frac{2 * 1}{2 * (2 - 1)} = 1 \\
C_c = \frac{2 * d_c}{m_c * (m_c - 1)} &= \frac{2 * 3}{4 * (4 - 1)} = \frac{1}{2} \\
C_d = \frac{2 * d_d}{m_d * (m_d - 1)} &= \frac{2 * 1}{2 * (2 - 1)} = 1 \\
C_e = \frac{2 * d_e}{m_e * (m_e - 1)} &= \frac{2 * 5}{4 * (4 - 1)} = \frac{5}{6} \\
C_f = \frac{2 * d_f}{m_f * (m_f - 1)} &= \frac{2 * 1}{2 * (2 - 1)} = 1
\end{aligned}
$$

2

The Mypic path is from node n to k to j to e to f. The shortest path is from n to m to l to f

3

We expect that D would be a higher than C. This is because the "Close-friend" List. This because there is a high chance that the people in this list would know each other. In the "Distant-friend", there is a less chance that one person would know each other. So it means that the person would need to travel more to find each other.

4

The Degree distribution is $\{0, 0.2, 0.1, 0.2, 0.2, 0.1, 0.1, 0.1\}$

5

In this network each group is a complete graph with each other. And everyone knows the other people in the other groups.Each person has a total of 29 friends and a total of 60 enemies. This shows that the network is not stable because the enemies outnumber the total amount of friends.

6

The nodes combination BCA and ADE satisfy the triadic closure principle

7

To find the average path length of the network, we use this formular $\frac{\log n}{\log k}$. n is 50 and k is 10. So our calculation is $\frac{\log 50}{\log 10} = 1.7$. The closest value is B, 2.