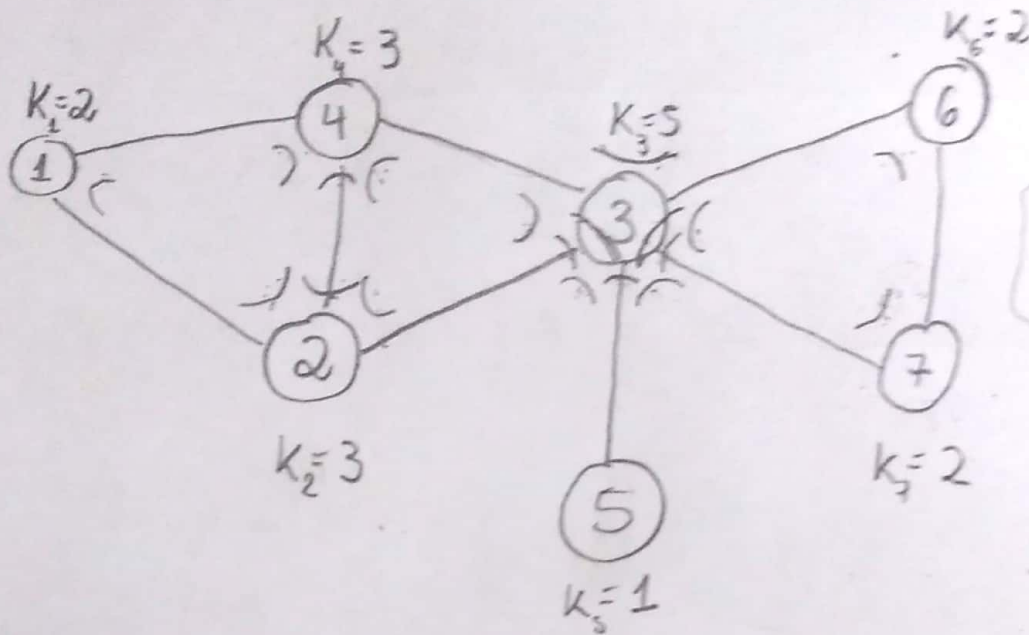


PROJETO 1 - REDES COMPLEXAS (1)

1. a)



$$K_i = \sum_{j=1}^N A_{ij}$$

$$P(k) = \frac{N_k}{N}$$

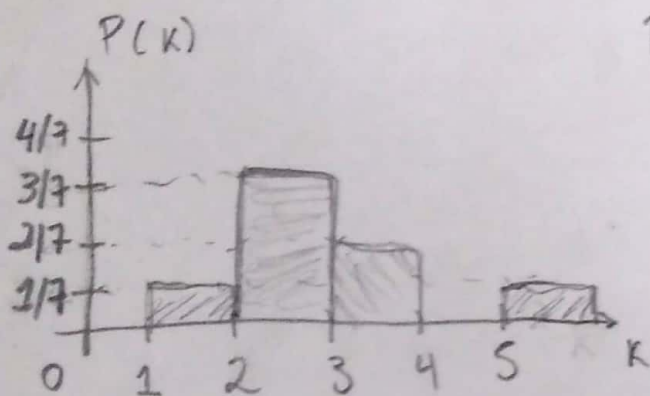
$$P(1) = \frac{1}{7}$$

$$P(2) = \frac{3}{7}$$

$$P(3) = \frac{2}{7}$$

$$P(4) = 0$$

$$P(5) = \frac{1}{7}$$



b) CLUSTER LOCAL

$$C_L = \frac{1}{N} \sum_{i=1}^N \frac{c_i}{N} , \quad c_i = \frac{2e_i}{K_i(K_i-1)}$$

$$\begin{aligned} c_5 &= N \cdot 2N \\ c_6 &= \frac{2 \times 1}{2^2} = 1 \\ c_7 &= \frac{2^2}{2} = 1 \end{aligned}$$

$$C_L = \frac{1}{N} \sum c_i = \frac{1}{7} \left(1 + \frac{2}{3} + \frac{1}{5} + \frac{2}{3} + 1 + 1 \right) \approx 0,6476$$

$$c_1 = \frac{2 \times 1}{2} = 1 \quad c_2 = \frac{2 \times 2}{3 \times 2} = \frac{2}{3} \quad c_3 = \frac{2 \times 2}{5 \times 4} = \frac{1}{5} \quad c_4 = \frac{2 \times 2}{3 \times 2} = \frac{2}{3}$$

c) CLUSTER GLOBAL

(2)

$$C = \frac{3 \times \text{Number of triangles}}{\text{Number of connected triple vertices}}$$

Number of connected triple vertices

$$= \frac{3 \times (3)}{19} = \frac{9}{19} \approx \underline{\underline{0,4737}}$$

D)

	1	2	3	4	5	6	7
1	0	1	2	1	3	3	3
2	1	0	1	1	2	2	2
3	2	1	0	1	1	1	1
4	1	1	1	0	2	2	2
5	3	2	1	2	0	2	2
6	3	2	1	2	2	0	1
7	3	2	1	2	2	1	0

E) Entropia da distribuição da probabilidade de graus

$$H = - \sum P(k) \log_2(P(k)) = - \left(\frac{1}{7} \log_2\left(\frac{1}{7}\right) + \frac{3}{7} \log_2\left(\frac{3}{7}\right) + \frac{2}{7} \log_2\left(\frac{2}{7}\right) + \frac{1}{7} \log_2\left(\frac{1}{7}\right) \right) \approx \underline{\underline{1,842371}}$$

F) Second moment

$$\langle k^2 \rangle = \sum k^2 P(k) = \left(1^2 \cdot \frac{1}{7} + 2^2 \cdot \frac{3}{7} + 3^2 \cdot \frac{2}{7} + 5^2 \cdot \frac{1}{7} \right) = 8$$