

# Simul - Lista 3

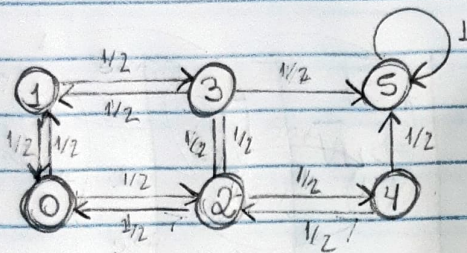
1)

1	3	5
		G
OR	2	4

A cada  $t=t+1$  o rato vai para uma sala vizinha com igual prob.

d)  $N^{\circ}_{\text{médios}} = \begin{bmatrix} 10 \\ 9 \\ 9 \\ 6 \\ 6 \\ 1 \end{bmatrix}$

a)



b)  $P_{ij} = \begin{bmatrix} 00 & 01 & 02 & 03 & 04 & 05 \\ 10 & 11 & 12 & 13 & 14 & 15 \\ 20 & 21 & 22 & 23 & 24 & 25 \\ 30 & 31 & 32 & 33 & 34 & 35 \\ 40 & 41 & 42 & 43 & 44 & 45 \\ 50 & 51 & 52 & 53 & 54 & 55 \end{bmatrix} = \begin{bmatrix} 0 & 1/2 & 1/2 & 0 & 0 & 0 \\ 1/2 & 0 & 0 & 1/2 & 0 & 0 \\ 1/2 & 0 & 0 & 0 & 1/2 & 0 \\ 0 & 1/2 & 0 & 0 & 0 & 1/2 \\ 0 & 0 & 1/2 & 0 & 0 & 1/2 \\ 0 & 0 & 0 & 0 & 1 & 0 \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}$

c) R em 5 depois de 3h

$P = \begin{pmatrix} 01 & 13 & 35 \\ 1/2 & 1/2 & 1/2 \end{pmatrix} + \begin{pmatrix} 02 & 24 & 45 \\ 1/2 & 1/2 & 1/2 \end{pmatrix} + \begin{pmatrix} 02 & 23 & 35 \\ 1/2 & 1/2 & 1/2 \end{pmatrix} = 3(1/8) = 3/8$   
 $P(t=3) = 3/8$

-1

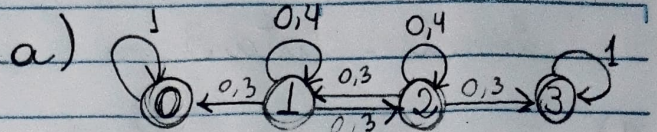
d)  $N = \begin{bmatrix} 1 & -1/2 & -1/2 & 0 & 0 & 0 \\ -1/2 & 1 & 0 & -1/2 & 0 & 0 \\ -1/2 & 0 & 1 & 0 & -1/2 & 0 \\ 0 & -1/2 & 0 & 1 & 0 & -1/2 \\ 0 & 0 & -1/2 & 0 & 1 & -1/2 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 3 & 2 & 2 & 1 & 1 & 1 \\ 2 & 2,66 & 1,33 & 1,33 & 0,66 & 1 \\ 2 & 1,33 & 2,66 & 0,66 & 1,33 & 1 \\ 1 & 1,33 & 0,66 & 1,66 & 0,33 & 1 \\ 1 & 0,66 & 1,33 & 0,33 & 1,66 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$



D	S	T	Q	Q	S	S
D	L	M	M	I	V	S

2)

A	M		A
0	1	0	3



b)

$$Q = \begin{bmatrix} 0^0 & 0^1 & 0^2 & 0^3 \\ 1^0 & 1^1 & 1^2 & 1^3 \\ 2^0 & 2^1 & 2^2 & 2^3 \\ 3^0 & 3^1 & 3^2 & 3^3 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0.3 & 0.4 & 0.3 & 0 \\ 0 & 0.3 & 0.4 & 0.3 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

c)

$$P(t=3) = (0.4)^3 + (0.4 \cdot 0.3^2) + (0.3^3)$$

$$P(t=3) = 0.064 + 0.036 + 0.027$$

$$P(t=3) = 0.127 = 12.7\%$$

d)

$$N = (I - Q)^{-1} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ -0.3 & 1.5 & 0 & 0 \\ -3/4 & 0 & 1.5 & -3/4 \\ 0 & 0 & 0 & 1 \end{bmatrix} \Rightarrow \bar{N} = \begin{bmatrix} 1 \\ 1.75 \\ 1 \\ 1 \end{bmatrix}$$

$$R = \begin{bmatrix} 1 & 0 \\ 0.3 & 0 \\ 0 & 0.3 \\ 0 & 1 \end{bmatrix}$$

e)

$$B = N \cdot R = \begin{bmatrix} 1 & 0 \\ 0 & 0 \\ -3/4 & 0 \\ 0 & 1 \end{bmatrix}$$