

2nd. $|n=4\rangle$ transition matrix & states.



$T =$

$$\alpha := 1/6$$

$$\beta := 2/6$$

$$T = \begin{matrix} & \begin{matrix} U & D & L & R & M & N \end{matrix} \\ \begin{matrix} U \\ D \\ L \\ R \\ M \\ N \end{matrix} & \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ \alpha & \alpha & \alpha & \alpha & \beta & 0 \\ \alpha & \alpha & \alpha & \alpha & 0 & \beta \end{pmatrix} \end{matrix}$$

canonical =

$$\begin{matrix} & \begin{matrix} M & N & U & D & L & R \end{matrix} \\ \begin{matrix} M \\ N \\ U \\ D \\ L \\ R \end{matrix} & \begin{pmatrix} \beta & 0 & \alpha & \alpha & \alpha & \alpha \\ 0 & \beta & \alpha & \alpha & \alpha & \alpha \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix} \end{matrix}$$

2a.

$n=5$ transition matrix:

$T =$

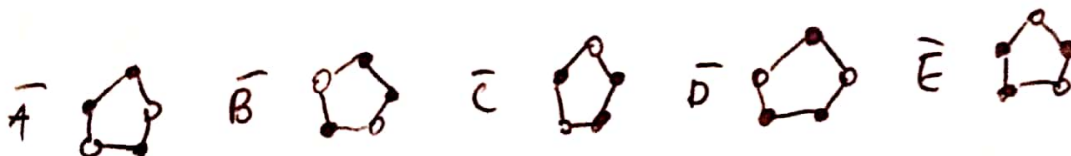
$$\alpha := \frac{1}{10}$$

$$\beta := \frac{6}{10}$$

	A	B	C	D	E	\bar{A}	\bar{B}	\bar{C}	\bar{D}	\bar{E}
A	1	0	0	0	0	0	0	0	0	0
B	0	1	0	0	0	0	0	0	0	0
C	0	0	1	0	0	0	0	0	0	0
D	0	0	0	1	0	0	0	0	0	0
E	0	0	0	0	1	0	0	0	0	0
\bar{A}	α	α	α	α	α	β	0	0	0	0
\bar{B}	α	α	α	α	α	0	β	0	0	0
\bar{C}	α	α	α	α	α	0	0	β	0	0
\bar{D}	0	α	α	α	α	0	0	0	β	0
\bar{E}	α	0	α	α	α	0	0	0	0	β

Canonical =

	\bar{A}	\bar{B}	\bar{C}	\bar{D}	\bar{E}	A	B	C	D	E
\bar{A}	β	0	0	0	0	α	α	0	α	α
\bar{B}	0	β	0	0	0	α	α	α	0	α
\bar{C}	0	0	β	0	0	α	α	α	α	0
\bar{D}	0	0	0	β	0	α	α	α	α	α
\bar{E}	0	0	0	0	β	α	0	α	α	α
A	0	0	0	0	0	1	0	0	0	0
B	0	0	0	0	0	0	1	0	0	0
C	0	0	0	0	0	0	0	1	0	0
D	0	0	0	0	0	0	0	0	1	0
E	0	0	0	0	0	0	0	0	0	1



2a. monte carlo $n = 4, \dots, 10$

n	abs. line
4	1.508
5	2.878
6	5.371
7	8.003
8	10.188
9	13.308
10	16.513

numerical $n = 4, 5$

n	abs. bin.
4	1.5
5	2.5

2b. $\boxed{n=4}$ first dot point.

same states as 2a.

$$\begin{aligned} 1 > \epsilon > 0 \\ \rho &:= 1 - 4\epsilon \\ \gamma &:= 1 - \epsilon \end{aligned}$$

$$T = \begin{matrix} & \begin{matrix} U & D & L & R & M & N \end{matrix} \\ \begin{matrix} U \\ D \\ L \\ R \\ M \\ N \end{matrix} & \begin{pmatrix} \rho & 0 & \epsilon/6 & \epsilon/6 & \epsilon/6 & \epsilon/6 \\ 0 & \rho & \epsilon/6 & \epsilon/6 & \epsilon/6 & \epsilon/6 \\ \epsilon/6 & \epsilon/6 & \rho & 0 & \epsilon/6 & \epsilon/6 \\ \epsilon/6 & \epsilon/6 & 0 & \rho & \epsilon/6 & \epsilon/6 \\ \epsilon/6 & \epsilon/6 & \epsilon/6 & \epsilon/6 & \frac{6-4\epsilon}{6} & 0 \\ \epsilon/6 & \epsilon/6 & \epsilon/6 & \epsilon/6 & 0 & \frac{6-4\epsilon}{6} \end{pmatrix} \end{matrix}$$

monte-carlo:

numerical:

$$[0.223, 0.233, 0.236, 0.279, 0.0016, 0.0016]$$

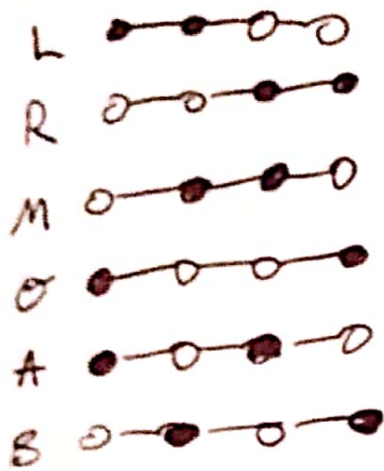
~~monte-carlo:~~

numerical:

$$[0.248, 0.248, 0.248, 0.248, 0.0025, 0.0025]$$

2b. $|n=4|$

second dot point



$$T = \begin{matrix} & \begin{matrix} L & R & M & O & A & B \end{matrix} \\ \begin{matrix} L \\ R \\ M \\ O \\ A \\ B \end{matrix} & \begin{pmatrix} p & 0 & \frac{2}{6} & \frac{2}{6} & \frac{2}{6} & \frac{2}{6} \\ 0 & p & \frac{2}{6} & \frac{2}{6} & \frac{2}{6} & \frac{2}{6} \\ \frac{2}{6} & \frac{2}{6} & p & 0 & \frac{2}{6} & \frac{2}{6} \\ \frac{2}{6} & \frac{2}{6} & 0 & p & \frac{2}{6} & \frac{2}{6} \\ \frac{2}{6} & \frac{2}{6} & \frac{2}{6} & \frac{2}{6} & p & 0 \\ \frac{2}{6} & \frac{2}{6} & \frac{2}{6} & \frac{2}{6} & 0 & p \end{pmatrix} \end{matrix}$$

$$1 > 2 > 0$$

$$p := 1 - 4\frac{2}{6}$$

$$\sigma := 1 - \frac{2}{6}$$

$$d := 1 - 2\frac{2}{6} - 2\frac{2}{6}$$

$$\beta := 1 - 3\frac{2}{6} - \frac{2}{6}$$

monte carlo :

[0.485, 0.489, 0.0017, 0.0017, 0.0017, 0.0017]

numerical :

[0.490, 0.490, 0.0082, 0.0049, 0.0033, 0.0033]