

Example 4.11

$P = \{ \{1/2, 1/2, 0\}, \{1/2, 1/4, 1/4\}, \{0, 1/3, 2/3\} \}; \text{MatrixForm}[P]$

$$\begin{pmatrix} \frac{1}{2} & \frac{1}{2} & 0 \\ \frac{1}{2} & \frac{1}{4} & \frac{1}{4} \\ 0 & \frac{1}{3} & \frac{2}{3} \end{pmatrix}$$

$P2 = \text{MatrixPower}[P, 2]; \text{MatrixForm}[P2]$

$$\begin{pmatrix} \frac{1}{2} & \frac{3}{8} & \frac{1}{8} \\ \frac{3}{8} & \frac{19}{48} & \frac{11}{48} \\ \frac{1}{6} & \frac{11}{36} & \frac{19}{36} \end{pmatrix}$$

Example 4.12

$P = \{ \{1/2, 1/2, 0, 0\}, \{1/2, 1/2, 0, 0\}, \{1/4, 1/4, 1/4, 1/4\}, \{0, 0, 0, 1\} \}; \text{MatrixForm}[P]$

$$\begin{pmatrix} \frac{1}{2} & \frac{1}{2} & 0 & 0 \\ \frac{1}{2} & \frac{1}{2} & 0 & 0 \\ \frac{1}{4} & \frac{1}{4} & \frac{1}{4} & \frac{1}{4} \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

$P2 = \text{MatrixPower}[P, 2]; \text{MatrixForm}[P2]$

$$\begin{pmatrix} \frac{1}{2} & \frac{1}{2} & 0 & 0 \\ \frac{1}{2} & \frac{1}{2} & 0 & 0 \\ \frac{5}{16} & \frac{5}{16} & \frac{1}{16} & \frac{5}{16} \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

$P3 = \text{MatrixPower}[P, 3]; \text{MatrixForm}[P3]$

$$\begin{pmatrix} \frac{1}{2} & \frac{1}{2} & 0 & 0 \\ \frac{1}{2} & \frac{1}{2} & 0 & 0 \\ \frac{21}{64} & \frac{21}{64} & \frac{1}{64} & \frac{21}{64} \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

$P4 = \text{MatrixPower}[P, 4]; \text{MatrixForm}[P4]$

$$\begin{pmatrix} \frac{1}{2} & \frac{1}{2} & 0 & 0 \\ \frac{1}{2} & \frac{1}{2} & 0 & 0 \\ \frac{85}{256} & \frac{85}{256} & \frac{1}{256} & \frac{85}{256} \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

`P11 = MatrixPower[P, 11]; MatrixForm[P11]`

$$\begin{pmatrix} \frac{1}{2} & \frac{1}{2} & 0 & 0 \\ \frac{1}{2} & \frac{1}{2} & 0 & 0 \\ \frac{1398101}{4194304} & \frac{1398101}{4194304} & \frac{1}{4194304} & \frac{1398101}{4194304} \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

Example 4.14

`P = {{1/2, 1/2, 0, 0, 0}, {1/2, 1/2, 0, 0, 0}, {0, 0, 1/2, 1/2, 0}, {0, 0, 1/2, 1/2, 0}, {1/4, 1/4, 0, 0, 1/2}}; MatrixForm[P]`

$$\begin{pmatrix} \frac{1}{2} & \frac{1}{2} & 0 & 0 & 0 \\ \frac{1}{2} & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & \frac{1}{2} & \frac{1}{2} & 0 \\ 0 & 0 & \frac{1}{2} & \frac{1}{2} & 0 \\ \frac{1}{4} & \frac{1}{4} & 0 & 0 & \frac{1}{2} \end{pmatrix}$$

`P2 = MatrixPower[P, 2]; MatrixForm[P2]`

$$\begin{pmatrix} \frac{1}{2} & \frac{1}{2} & 0 & 0 & 0 \\ \frac{1}{2} & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & \frac{1}{2} & \frac{1}{2} & 0 \\ 0 & 0 & \frac{1}{2} & \frac{1}{2} & 0 \\ \frac{3}{8} & \frac{3}{8} & 0 & 0 & \frac{1}{4} \end{pmatrix}$$

`P3 = MatrixPower[P, 3]; MatrixForm[P3]`

$$\begin{pmatrix} \frac{1}{2} & \frac{1}{2} & 0 & 0 & 0 \\ \frac{1}{2} & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & \frac{1}{2} & \frac{1}{2} & 0 \\ 0 & 0 & \frac{1}{2} & \frac{1}{2} & 0 \\ \frac{7}{16} & \frac{7}{16} & 0 & 0 & \frac{1}{8} \end{pmatrix}$$

`P4 = MatrixPower[P, 4]; MatrixForm[P4]`

$$\begin{pmatrix} \frac{1}{2} & \frac{1}{2} & 0 & 0 & 0 \\ \frac{1}{2} & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & \frac{1}{2} & \frac{1}{2} & 0 \\ 0 & 0 & \frac{1}{2} & \frac{1}{2} & 0 \\ \frac{15}{32} & \frac{15}{32} & 0 & 0 & \frac{1}{16} \end{pmatrix}$$