Calculating a matrix P:

In[7]:=
```
n = 7;
G = {
   {0, 1, 0, 0, 0, 0, 0},
   {0, 0, 0, 1, 0, 0, 0},
   {0, 1, 0, 1, 1, 0, 0},
   {0, 0, 0, 0, 0, 1, 0},
   {1, 1, 0, 1, 0, 1, 0},
   {0, 0, 0, 0, 0, 0, 1},
   {0, 1, 0, 0, 0, 0, 0}
  };
ζ = 0.85;
r = Total[G, {2}];
P = ζ G / r + (1 - ζ) / n;
Print["Matrix P is ", P // MatrixForm]
```

Matrix P is $\begin{pmatrix} 0.0214286 & 0.871429 & 0.0214286 & 0.0214286 & 0.0214286 & 0.0214286 & 0.0214286 \\ 0.0214286 & 0.0214286 & 0.0214286 & 0.871429 & 0.0214286 & 0.0214286 & 0.0214286 \\ 0.0214286 & 0.304762 & 0.0214286 & 0.304762 & 0.304762 & 0.0214286 & 0.0214286 \\ 0.0214286 & 0.0214286 & 0.0214286 & 0.0214286 & 0.0214286 & 0.871429 & 0.0214286 \\ 0.233929 & 0.233929 & 0.0214286 & 0.233929 & 0.0214286 & 0.233929 & 0.0214286 \\ 0.0214286 & 0.0214286 & 0.0214286 & 0.0214286 & 0.0214286 & 0.0214286 & 0.871429 \\ 0.0214286 & 0.871429 & 0.0214286 & 0.0214286 & 0.0214286 & 0.0214286 & 0.0214286 \end{pmatrix}$

We set $m = 30$ and find the value of expression $w = w_0 P^m$ by placing various initial vectors w_0:

In[15]:=
```
m = 30;
w0 = ConstantArray[1/n, 7];
w = w0.MatrixPower[P, m];
Print["Stationary vector with w0 = ", w0 // MatrixForm, " is ", w // MatrixForm]
```

Stationary vector with w0 = $\begin{pmatrix} \frac{1}{7} \\ \frac{1}{7} \\ \frac{1}{7} \\ \frac{1}{7} \\ \frac{1}{7} \\ \frac{1}{7} \\ \frac{1}{7} \end{pmatrix}$ is $\begin{pmatrix} 0.0272723 \\ 0.240061 \\ 0.0214286 \\ 0.238631 \\ 0.0275 \\ 0.229182 \\ 0.215925 \end{pmatrix}$

In[ ]:=
```
w0 = {1/3, 1/3, 0, 0, 1/3, 0, 0};
w = w0.MatrixPower[P, m];
Print["Stationary vector with w0 = ", w0 // MatrixForm, " is ", w // MatrixForm]
```

Stationary vector with w0 = $\begin{pmatrix} \frac{1}{3} \\ \frac{1}{3} \\ 0 \\ 0 \\ \frac{1}{3} \\ 0 \\ 0 \end{pmatrix}$ is $\begin{pmatrix} 0.0272723 \\ 0.239244 \\ 0.0214286 \\ 0.238904 \\ 0.0275 \\ 0.230545 \\ 0.215107 \end{pmatrix}$

Exact solution:

In[19]:=
```
Solve[W == W.P && Total[W, {1}] == 1 && W ∈ Vectors[n, Reals], W]
```

Out[19]=
```
{{W → {0.0272723, 0.240424, 0.0214286, 0.237704, 0.0275, 0.229321, 0.216351}}}
```