Example: Weather path probabilities (Section 1.5)

Transition matrix

```
In[21]:= P := {{0.8, 0.2}, {0.5, 0.5}};
        P // MatrixForm
```

Out[22]//MatrixForm=

$$\begin{pmatrix} 0.8 & 0.2 \\ 0.5 & 0.5 \end{pmatrix}$$

Find predictions for future's weather: sunny all the time?

Initial distribution: on Monday it's sunny

```
In[23]:= mu0 := {{0, 1}};
        mu0 // MatrixForm
```

Out[24]//MatrixForm=

$$\begin{pmatrix} 0 & 1 \end{pmatrix}$$

Probability that also on Tuesday-Thursday it's sunny every day (3 days)

Matrix element P(2,2) (from sunny to sunny):

```
In[25]:= p22 := P[[2, 2]];
```

```
In[26]:= mu0[[1, 2]] * p22 * p22 * p22
```

Out[26]= 0.125

Probability that after Monday it's also sunny every day for 14 days

```
In[27]:= mu0[[1, 2]] * p22^14
```

Out[27]= 0.0000610352

Find predictions for future's weather: cloudy all the time?

Initial distribution: on Monday it's cloudy

```
In[28]:= nu0 := {{1, 0}};
        nu0 // MatrixForm
```

Out[29]//MatrixForm=

$$\begin{pmatrix} 1 & 0 \end{pmatrix}$$

Probability that also on Tuesday-Thursday it's cloudy every day (3 days)

Matrix element P(1,1) (from cloudy to cloudy):

In[30]:= `p11 := P[[1, 1]];`

In[31]:= `nu0[[1, 1]] * p11 * p11 * p11`

Out[31]= `0.512`

Probability that after Monday it's also cloudy every day for 14 days

In[32]:= `nu0[[1, 1]] * p11^14`

Out[32]= `0.0439805`

Paths all sunny / all cloudy aren't the same.

In[33]:= `mu0[[1, 2]] * p22^14`
`nu0[[1, 1]] * p11^14`

Out[33]= `0.0000610352`

Out[34]= `0.0439805`