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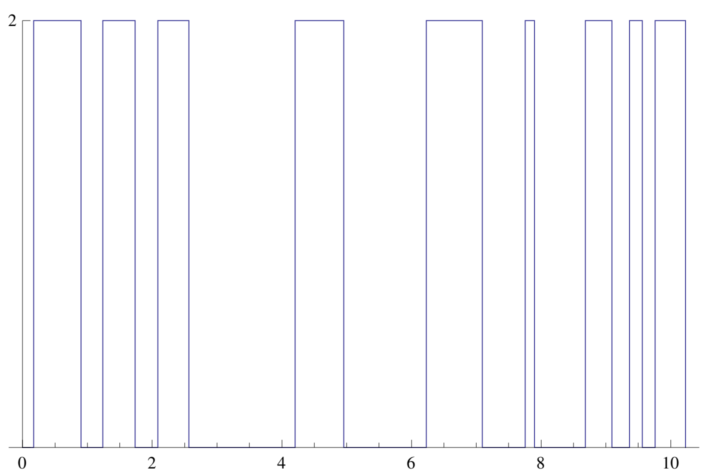
Continious Time Markov Chain

In[14]:=
```
𝒫1 = ContinuousMarkovProcess[{1, 0}, (-1.  1.
                                      2   -2)];
data = RandomFunction[𝒫1, {0, 10}]
ListLinePlot[data, InterpolationOrder → 0,
 PlotRange → {1, 2}, Ticks → {Automatic, {1, 2}}]
```

Out[15]= TemporalData[1]

Out[16]=



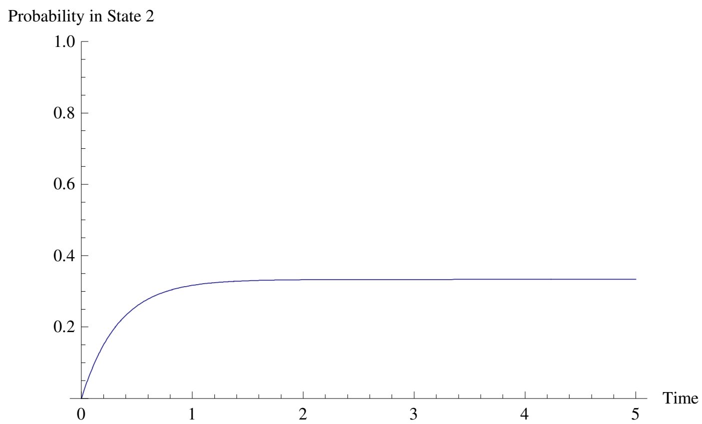
In[17]:=
```
PDF[𝒫1[t], k] // PiecewiseExpand
```

Out[17]=

$$\begin{cases} \frac{0.333333\left(-1.+1.\times 2.71828^{3.t}\right)}{-1.04673\times 10^{-16}+1.\times 2.71828^{3.t}} & k == 2 \\ \frac{0.666667\left(0.5+1.\times 2.71828^{3.t}\right)}{-1.04673\times 10^{-16}+1.\times 2.71828^{3.t}} & k == 1 \\ 0 & \text{True} \end{cases}$$

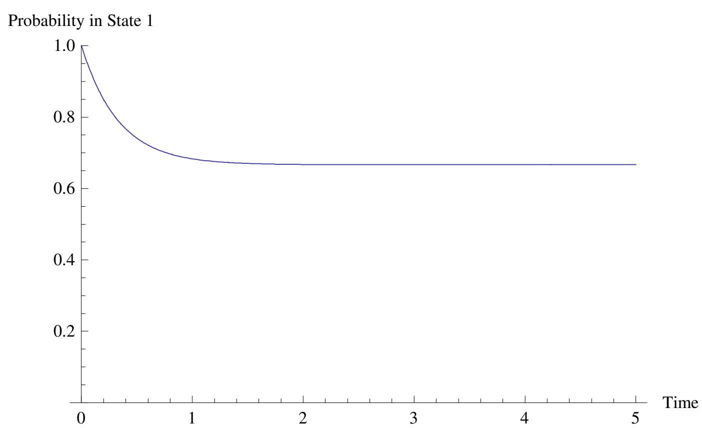
In[37]:=
```
Plot[(0.3333333333333335` (-1.` + 1.` × 2.718281828459045`^(3.` t)))/(-1.0467283057891839`*^-16 + 1.` × 2.718281828459045`^(3.` t)), {t, 0, 5},
 AxesLabel → {"Time", "Probability in State 2"}, PlotRange → {0, 1}]
```

Out[37]=



In[35]:=
```
Plot[(0.6666666666666666` (0.5000000000000001` + 1.` × 2.718281828459045`^(3.` t)))/(-1.0467283057891839`*^-16 + 1.` × 2.718281828459045`^(3.` t)),
 {t, 0, 5}, AxesLabel → {"Time", "Probability in State 1"}, PlotRange → {0, 1}]
```

Out[35]=



In[18]:=
```
PDF[𝒫1[∞], 1]
PDF[𝒫1[∞], 2]
```

Out[18]= 0.666667

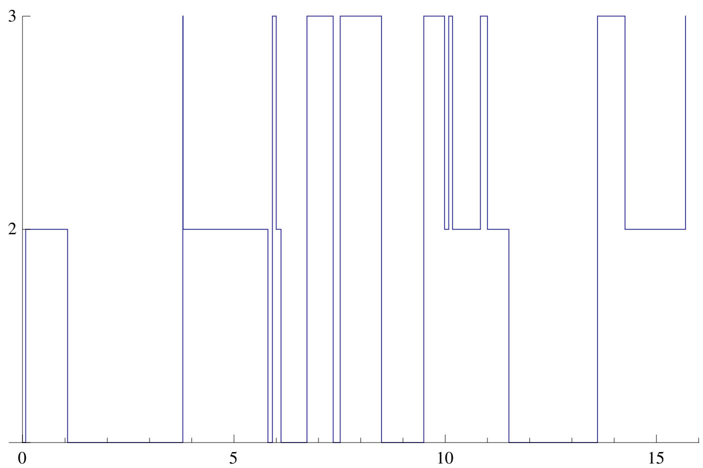
Out[19]= 0.333333

In[20]:=
```
𝒫 = ContinuousMarkovProcess[{1, 0, 0}, (-1   .5   .5
                                        1    -2   1
                                        1.5  1.5  -3)];
```

In[25]:=
```
data = RandomFunction[𝒫, {0, 15}]
ListLinePlot[data, InterpolationOrder → 0,
 PlotRange → {1, 3}, Ticks → {Automatic, {1, 2, 3}}]
```

Out[25]= `TemporalData[ 1 ]`

Out[26]=



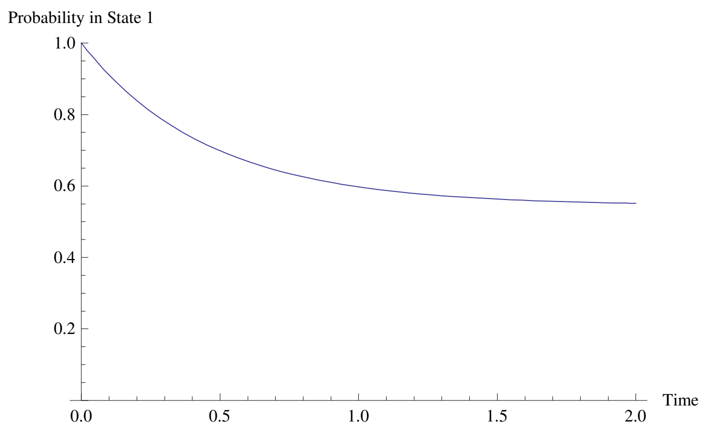
In[27]:=
```
PDF[𝒫[t], k] // PiecewiseExpand
```

Out[27]=

$$\begin{cases} \frac{7.10375\times10^{15}\left(1.\times 2.71828^{2.13397\,t}+1.81165\times 2.71828^{3.86603\,t}-2.81165\times 2.71828^{6.\,t}\right)}{1.\times 2.71828^{2.13397\,t}-27.0448\times 2.71828^{3.86603\,t}-1.09853\times10^{17}\times 2.71828^{6.\,t}} & k == 3 \\ -\frac{5.20031\times10^{15}\left(1.\times 2.71828^{2.13397\,t}-6.76119\times 2.71828^{3.86603\,t}+5.76119\times 2.71828^{6.\,t}\right)}{1.\times 2.71828^{2.13397\,t}-27.0448\times 2.71828^{3.86603\,t}-1.09853\times10^{17}\times 2.71828^{6.\,t}} & k == 2 \\ -\frac{1.90345\times10^{15}\left(1.\times 2.71828^{2.13397\,t}+25.2331\times 2.71828^{3.86603\,t}+31.4797\times 2.71828^{6.\,t}\right)}{1.\times 2.71828^{2.13397\,t}-27.0448\times 2.71828^{3.86603\,t}-1.09853\times10^{17}\times 2.71828^{6.\,t}} & k == 1 \\ 0 & \text{True} \end{cases}$$

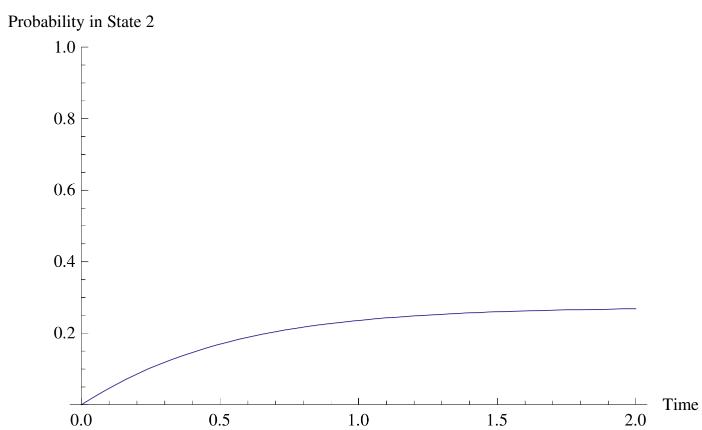
In[43]:=
```
Plot[-(1.9034451701858438`*^15 (1.` × 2.718281828459045`^(2.1339745962155594` t) +
        25.233096782319073` × 2.718281828459045`^(3.866025403784439` t) +
        31.479716138782855` × 2.718281828459045`^(5.999999999999997` t))) /
   (1.` × 2.718281828459045`^(2.1339745962155594` t) - 27.044751621435047` ×
      2.718281828459045`^(3.866025403784439` t) -
     1.0985317501251058`*^17 × 2.718281828459045`^(5.999999999999997` t)),
 {t, 0, 2}, AxesLabel → {"Time", "Probability in State 1"},
 PlotRange → {0, 1}]
```

Out[43]=



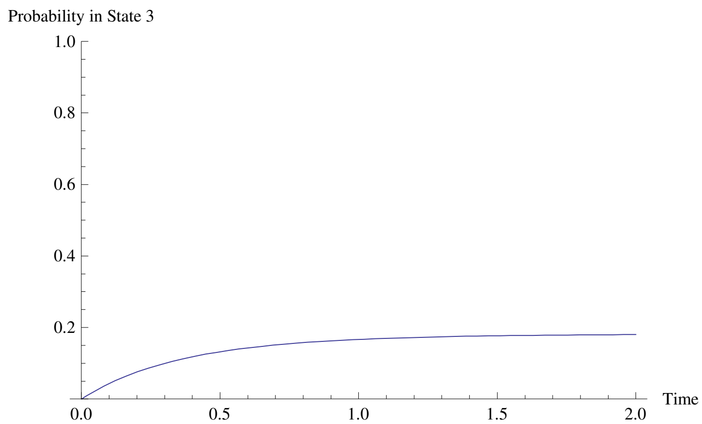
In[44]:=
```
Plot[-(5.200308914369307`*^15 (1.` × 2.718281828459045`^(2.1339745962155594` t) -
        6.761187905358761` × 2.718281828459045`^(3.866025403784439` t) +
        5.76118790535876` × 2.718281828459045`^(5.999999999999997` t))) /
   (1.` × 2.718281828459045`^(2.1339745962155594` t) - 27.044751621435047` ×
      2.718281828459045`^(3.866025403784439` t) -
     1.0985317501251058`*^17 × 2.718281828459045`^(5.999999999999997` t)),
 {t, 0, 2}, AxesLabel → {"Time", "Probability in State 2"},
 PlotRange → {0, 1}]
```

Out[44]=



In[45]:=
```
Plot[(7.103754084555151`*^15 (1.` × 2.718281828459045`^(2.1339745962155594` t) +
      1.811654839115953` × 2.718281828459045`^(3.866025403784439` t) -
      2.8116548391159526` × 2.718281828459045`^(5.999999999999997` t))) /
   (1.` × 2.718281828459045`^(2.1339745962155594` t) - 27.044751621435047` ×
      2.718281828459045`^(3.866025403784439` t) -
     1.0985317501251058`*^17 × 2.718281828459045`^(5.999999999999997` t)),
  {t, 0, 2}, AxesLabel → {"Time", "Probability in State 3"},
  PlotRange → {0, 1}]
```

Out[45]=



In[28]:=
```
PDF[𝒫[∞], 1]
PDF[𝒫[∞], 2]
PDF[𝒫[∞], 3]
```

Out[28]= 0.545455

Out[29]= 0.272727

Out[30]= 0.181818