Calcolo della FdT per un sistema LTI-TD

In[•]:=
```
A = {{0, 1}, {1/12, 1/12}}; B = {{0}, {1}}; C1 = {{0, 1}};
```

Mi calcolo il polinomio caratteristico di A

In[•]:=
```
CharacteristicPolynomial[A, λ]
```

Out[•]=

$$-\frac{1}{12}-\frac{\lambda}{12}+\lambda^2$$

In[•]:=
```
Factor[CharacteristicPolynomial[A, λ]]
```

Out[•]=

$$\frac{1}{12}\,(-1+3\,\lambda)\,(1+4\,\lambda)$$

Mi calcolo la FdT a partire dalla definizione $G(z) = C\,(z\,I - A)^{-1}\,B$

In[•]:=
```
G[z_] := Simplify[C1.Inverse[z IdentityMatrix[2] - A].B]
```

In[•]:=
```
G[z]
```

Out[•]=

$$\left\{\left\{-\frac{12\,z}{1+z-12\,z^2}\right\}\right\}$$

Mi calcolo poli e zeri del sistema

In[•]:=
```
Solve[Denominator[G[z][[1, 1]]] == 0, z]
```

Out[•]=

$$\left\{\left\{z\to-\frac{1}{4}\right\},\left\{z\to\frac{1}{3}\right\}\right\}$$

In[•]:=
```
Solve[Numerator[G[z][[1, 1]]] == 0, z]
```

Out[•]=

$$\{\{z\to 0\}\}$$

Incapsuliamo A, B, C dentro la struttura di Mathematica che “designa” l’oggetto “Sistema Dinamico”

In[•]:=
```
Σ = StateSpaceModel[{A, B, C1}, SamplingPeriod → 1]
```

Out[•]=

$$\left(\begin{array}{cc|c} 0 & 1 & 0 \\ \frac{1}{12} & \frac{1}{12} & 1 \\ \hline 0 & 1 & 0 \end{array}\right)_1$$

S

In[•]:= **TransferFunctionModel[Σ]**

Out[•]=

$$\left(\frac{z}{-\frac{1}{12}-\frac{z}{12}+z^2}\right)_{1}^{\tau}$$

In[•]:= **TransferFunctionPoles[Σ]**

Out[•]=

$$\left\{\left\{\left\{-\frac{1}{4},\ \frac{1}{3}\right\}\right\}\right\}$$

In[•]:= **TransferFunctionZeros[Σ]**

Out[•]=

$$\{\{\{0\}\}\}$$