In[2]:=
```
(* Esempio di matrice *)
```

In[3]:=
```
A = {{23, 35}, {-3, 1}}
```

Out[3]=
```
{{23, 35}, {-3, 1}}
```

In[4]:=
```
A // MatrixForm
```

Out[4]//MatrixForm=

$$\begin{pmatrix} 23 & 35 \\ -3 & 1 \end{pmatrix}$$

In[5]:=
```
(* Matrice identica di ordine 2 *)
```

In[6]:=
```
I2 = IdentityMatrix[2]
```

Out[6]=
```
{{1, 0}, {0, 1}}
```

In[7]:=
```
I2 // MatrixForm
```

Out[7]//MatrixForm=

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

```
(* Matrice A - m I   (per brevita' uso "m" invece di "lambda") *)
```

In[9]:=
```
Am = A - m * I2
```

Out[9]=
```
{{23 - m, 35}, {-3, 1 - m}}
```

In[10]:=
```
Am // MatrixForm
```

Out[10]//MatrixForm=

$$\begin{pmatrix} 23 - m & 35 \\ -3 & 1 - m \end{pmatrix}$$

In[11]:=
```
(* det(A-mI) *)
```

In[12]:=
```
d = Det[Am]
```

Out[12]=
$$128 - 24\,m + m^2$$

In[13]:=
```
(* autovalori *)
```

In[14]:=
```
s = Solve[d == 0, m]
```

Out[14]=
```
{{m → 8}, {m → 16}}
```

In[15]:=
```
m1 = m /. First[First[s]]
```

Out[15]=
```
8
```

In[16]:=
```
m2 = m /. First[Last[s]]
```

Out[16]=
```
16
```

In[17]:=
```
m1
```

Out[17]=
```
8
```

In[18]:=
```
m2
```

Out[18]=
```
16
```

In[19]:=
```
(* costruire e risolvere i sistemi
   (A - m1 I)v1=0  (A - m2 I)v2=0 *)
```

In[20]:=
```
equat = (A - m1 * I2).{{v1}, {v2}}
```

Out[20]=
```
{{15 v1 + 35 v2}, {-3 v1 - 7 v2}}
```

In[21]:=
```
eq1 = First[equat[[1]]] == 0
```

Out[21]=
```
15 v1 + 35 v2 == 0
```

In[22]:=
```
eq2 = First[equat[[2]]] == 0
```

Out[22]=
```
-3 v1 - 7 v2 == 0
```

In[23]:=
```
eqs = Simplify[{eq1, eq2}]
```

Out[23]=
$$\{3\,v1 + 7\,v2 == 0,\ 3\,v1 + 7\,v2 == 0\}$$

In[24]:=
```
w1 = Solve[{eq1, eq2}, {v1, v2}]
```

Solve::svars : Equations may not give solutions for all "solve" variables. ≫

Out[24]=
$$\left\{\left\{v2 \to -\frac{3\,v1}{7}\right\}\right\}$$

In[25]:=
```
(* quindi: esempio autovettore associato a m1 = (1,-3/7)^T *)
```

In[26]:=
```
(* controllo i risultati usando un comando Mathematica *)
```

In[27]:=
```
egs = Eigensystem[A]
```

Out[27]=
$$\{\{16, 8\}, \{\{-5, 1\}, \{-7, 3\}\}\}$$

In[28]:=
```
egv2 = {-7, 3}
```

Out[28]=
$$\{-7, 3\}$$

In[29]:=
```
negv2 = Norm[egv2]
```

Out[29]=
$$\sqrt{58}$$

In[30]:=
```
egv2norm = egv2 / negv2
```

Out[30]=
$$\left\{-\frac{7}{\sqrt{58}}, \frac{3}{\sqrt{58}}\right\}$$

In[31]:=
```
Norm[egv2norm]
```

Out[31]=
$$1$$