

```

In[13]:=  $\gamma = \gamma$ 
          $\Omega = \Omega$ 
(* Define the matrix *)
matrix = {
  {0,  $\text{I} \Omega$ ,  $-\text{I} \Omega$ ,  $\gamma$ },
  { $\text{I} \Omega$ ,  $-\gamma/2$ , 0,  $-\text{I} \Omega$ },
  { $-\text{I} \Omega$ , 0,  $-\gamma/2$ ,  $\text{I} \Omega$ },
  {0,  $-\text{I} \Omega$ ,  $\text{I} \Omega$ ,  $-\gamma$ }
};
(* Calculate eigenvalues and eigenvectors *)
{eigenvalues, eigenvectors} = Eigensystem[matrix];

(* Express the results *)
Print["Eigenvalues: ", eigenvalues];
Print["Eigenvectors: ", eigenvectors];

```

Out[13]=

$\gamma$

Out[14]=

$\Omega$

Eigenvalues:  $\left\{0, -\frac{\gamma}{2}, \frac{1}{4} \left(-3\gamma - \sqrt{\gamma^2 - 64\Omega^2}\right), \frac{1}{4} \left(-3\gamma + \sqrt{\gamma^2 - 64\Omega^2}\right)\right\}$

Eigenvectors:  $\left\{\left\{1 + \frac{\gamma^2}{4\Omega^2}, \frac{i\gamma}{2\Omega}, -\frac{i\gamma}{2\Omega}, 1\right\}, \{0, 1, 1, 0\},\right.$

$\left\{-1, \frac{8i\Omega}{\gamma + \sqrt{\gamma^2 - 64\Omega^2}}, -\frac{8i\Omega}{\gamma + \sqrt{\gamma^2 - 64\Omega^2}}, 1\right\}, \left\{-1, -\frac{8i\Omega}{-\gamma + \sqrt{\gamma^2 - 64\Omega^2}}, \frac{8i\Omega}{-\gamma + \sqrt{\gamma^2 - 64\Omega^2}}, 1\right\}\right\}$