In[3]:=
```
Eigenvalues[{{Δ, Ω}, {Ω, -Δ}}]
```

Out[3]=
$$\left\{-\sqrt{\Delta^2+\Omega^2},\ \sqrt{\Delta^2+\Omega^2}\right\}$$

In[41]:=
```
Eigenvectors[{{Δ, Ω}, {Ω, -Δ}}]
```

Out[41]=
$$\left\{\left\{-\frac{-\Delta+\sqrt{\Delta^2+\Omega^2}}{\Omega},\ 1\right\},\ \left\{-\frac{-\Delta-\sqrt{\Delta^2+\Omega^2}}{\Omega},\ 1\right\}\right\}$$

In[36]:=
```
Assumptions → {Element[Δ, Reals], Element[Ω, Reals]}
N1 = Sqrt[((Δ - Sqrt[Δ^2 + Ω^2])^2 + Ω^2)/Ω^2]
N2 = Sqrt[((+Δ + Sqrt[Δ^2 + Ω^2])^2 + Ω^2)/Ω^2]
```

Out[36]=
$$\text{Assumptions} \to \{\Delta \in \mathbb{R},\ \Omega \in \mathbb{R}\}$$

Out[37]=
$$\sqrt{\frac{\Omega^2+\left(\Delta-\sqrt{\Delta^2+\Omega^2}\right)^2}{\Omega^2}}$$

Out[38]=
$$\sqrt{\frac{\Omega^2+\left(\Delta+\sqrt{\Delta^2+\Omega^2}\right)^2}{\Omega^2}}$$

In[40]:=
```
v1 = FullSimplify[{(Δ - Sqrt[Δ^2 + Ω^2])/Ω} / {N1, 1/N1}]
```

Out[40]=
$$\left\{\frac{\Delta-\sqrt{\Delta^2+\Omega^2}}{\Omega\sqrt{1+\frac{\left(\Delta-\sqrt{\Delta^2+\Omega^2}\right)^2}{\Omega^2}}},\ \frac{1}{\sqrt{1+\frac{\left(\Delta-\sqrt{\Delta^2+\Omega^2}\right)^2}{\Omega^2}}}\right\}$$

In[43]:=
```
v2 = FullSimplify[{(Δ + Sqrt[Δ^2 + Ω^2])/Ω} / {N2, 1/N2}]
```

Out[43]=
$$\left\{\frac{\Delta+\sqrt{\Delta^2+\Omega^2}}{\Omega\sqrt{1+\frac{\left(\Delta+\sqrt{\Delta^2+\Omega^2}\right)^2}{\Omega^2}}},\ \frac{1}{\sqrt{1+\frac{\left(\Delta+\sqrt{\Delta^2+\Omega^2}\right)^2}{\Omega^2}}}\right\}$$