In[•]:= $\mathbf{F_2}$

Out[•]= F_2

In[•]:= $\boldsymbol{\xi_2} \; \mathbf{:=} \; -\mathbf{i}\,\mathbf{B}\,\mathbf{c} - \dfrac{1}{2}\,\mathbf{i}\,\mathbf{B}\,\mathbf{c^3} - 3\,\mathbf{i}\,\mathbf{a}\,\mathbf{e^{i\,t}} + 2\,\mathbf{i}\,\mathbf{a}\,\mathbf{c^2}\,\mathbf{e^{i\,t}} - \dfrac{3}{2}\,\mathbf{i}\,\mathbf{b}\,\mathbf{c}\,\mathbf{e^{2\,i\,t}} + \mathbf{i}\,\mathbf{c^2}\,\mathbf{e^{-i\,t}}\,\mathbf{G} + \dfrac{\mathbf{i}\,\mathbf{v_2}}{2} - \dfrac{\mathbf{w_2}}{2}$

In[•]:= $\boldsymbol{\xi_2}$

Out[•]= $-\mathbf{i}\,B\,c - \dfrac{1}{2}\,\mathbf{i}\,B\,c^3 - 3\,\mathbf{i}\,a\,e^{i\,t} + 2\,\mathbf{i}\,a\,c^2\,e^{i\,t} - \dfrac{3}{2}\,\mathbf{i}\,b\,c\,e^{2\,i\,t} + \mathbf{i}\,c^2\,e^{-i\,t}\,G + \dfrac{\mathbf{i}\,v_2}{2} - \dfrac{w_2}{2}$

In[•]:= $\boldsymbol{\xi_3} \; \mathbf{:=} \; 2\,\mathbf{i}\,\mathbf{a}\,\mathbf{c} + \mathbf{i}\,\mathbf{a}\,\mathbf{c^3} - \dfrac{1}{2}\,\mathbf{i}\,\mathbf{B}\,\mathbf{c^2}\,\mathbf{e^{-i\,t}} - \dfrac{3}{2}\,\mathbf{i}\,\mathbf{b}\,\mathbf{e^{i\,t}} + \mathbf{i}\,\mathbf{b}\,\mathbf{c^2}\,\mathbf{e^{i\,t}} - 3\,\mathbf{i}\,\mathbf{c}\,\mathbf{e^{2\,i\,t}}\,\mathbf{g} + \dfrac{\mathbf{i}\,\mathbf{v_3}}{2} - \dfrac{\mathbf{w_3}}{2}$

In[•]:= $\boldsymbol{\eta_2} \; \mathbf{:=} \; -\mathbf{B}\,\mathbf{c} - \dfrac{\mathbf{B}\,\mathbf{c^3}}{2} - 5\,\mathbf{a}\,\mathbf{e^{i\,t}} - 2\,\mathbf{a}\,\mathbf{c^2}\,\mathbf{e^{i\,t}} + \dfrac{1}{2}\,\mathbf{b}\,\mathbf{c}\,\mathbf{e^{2\,i\,t}} + 3\,\mathbf{c^2}\,\mathbf{e^{-i\,t}}\,\mathbf{G} + \dfrac{\mathbf{v_2}}{2} + \dfrac{\mathbf{i}\,\mathbf{w_2}}{2}$

In[•]:= $\boldsymbol{\eta_3} \; \mathbf{:=} \; 2\,\mathbf{a}\,\mathbf{c} + \mathbf{a}\,\mathbf{c^3} - \dfrac{3}{2}\,\mathbf{B}\,\mathbf{c^2}\,\mathbf{e^{-i\,t}} - \dfrac{5}{2}\,\mathbf{b}\,\mathbf{e^{i\,t}} - \mathbf{b}\,\mathbf{c^2}\,\mathbf{e^{i\,t}} + \mathbf{c}\,\mathbf{e^{2\,i\,t}}\,\mathbf{g} + \dfrac{\mathbf{v_3}}{2} + \dfrac{\mathbf{i}\,\mathbf{w_3}}{2}$

In[•]:= $\mathbf{sol_2} = \mathbf{DSolve}\big[$

$\Big\{\mathbf{l'[t]} == -\mathbf{i}\,B\,c - \dfrac{1}{2}\,\mathbf{i}\,B\,c^3 - 3\,\mathbf{i}\,a\,e^{i\,t} + 2\,\mathbf{i}\,a\,c^2\,e^{i\,t} - \dfrac{3}{2}\,\mathbf{i}\,b\,c\,e^{2\,i\,t} + \mathbf{i}\,c^2\,e^{-i\,t}\,G + \dfrac{\mathbf{i}\,l[t]}{2} - \dfrac{m[t]}{2},$

$\mathbf{m'[t]} == -B\,c - \dfrac{B\,c^3}{2} - 5\,a\,e^{i\,t} - 2\,a\,c^2\,e^{i\,t} + \dfrac{1}{2}\,b\,c\,e^{2\,i\,t} + 3\,c^2\,e^{-i\,t}\,G + \dfrac{l[t]}{2} + \dfrac{\mathbf{i}\,m[t]}{2}\Big\}, \{l[t],$

$m[t]\}, t\big]$

Out[•]= $\Big\{\Big\{l[t] \rightarrow -\dfrac{1}{2}\,\mathbf{i}\,e^{\frac{i\,t}{2}}$

$\big(\mathbf{i}\,(2\,a - b\,c + 4\,a\,c^2)\,e^{i\,t} - \mathbf{i}\,b\,c\,e^{2\,i\,t} - 2\,\mathbf{i}\,c^2\,e^{-2\,i\,t}\,G + \mathbf{i}\,c\,e^{-i\,t}\,(2\,B + B\,c^2 + 2\,c\,G) + 8\,a\,t\big)$

$\mathbf{Cos}\big[\dfrac{t}{2}\big] + e^{\frac{i\,t}{2}}\,C[1]\,\mathbf{Cos}\big[\dfrac{t}{2}\big] - \dfrac{1}{2}\,e^{\frac{i\,t}{2}}\,\big(-\mathbf{i}\,B\,c\,(2 + c^2)\,e^{-i\,t} + \mathbf{i}\,b\,c\,e^{i\,t} + 2\,\mathbf{i}\,a\,(1 + 2\,c^2)\,e^{i\,t} -$

$\mathbf{i}\,b\,c\,e^{2\,i\,t} + 2\,\mathbf{i}\,c^2\,e^{-i\,t}\,G + 2\,\mathbf{i}\,c^2\,e^{-2\,i\,t}\,G - 8\,a\,t\big)\,\mathbf{Sin}\big[\dfrac{t}{2}\big] - e^{\frac{i\,t}{2}}\,C[2]\,\mathbf{Sin}\big[\dfrac{t}{2}\big],$

$m[t] \rightarrow \dfrac{1}{2}\,e^{\frac{i\,t}{2}}\,\big(-\mathbf{i}\,B\,c\,(2 + c^2)\,e^{-i\,t} + \mathbf{i}\,b\,c\,e^{i\,t} + 2\,\mathbf{i}\,a\,(1 + 2\,c^2)\,e^{i\,t} - \mathbf{i}\,b\,c\,e^{2\,i\,t} +$

$2\,\mathbf{i}\,c^2\,e^{-i\,t}\,G + 2\,\mathbf{i}\,c^2\,e^{-2\,i\,t}\,G - 8\,a\,t\big)\,\mathbf{Cos}\big[\dfrac{t}{2}\big] + e^{\frac{i\,t}{2}}\,C[2]\,\mathbf{Cos}\big[\dfrac{t}{2}\big] - \dfrac{1}{2}\,\mathbf{i}\,e^{\frac{i\,t}{2}}$

$\big(\mathbf{i}\,(2\,a - b\,c + 4\,a\,c^2)\,e^{i\,t} - \mathbf{i}\,b\,c\,e^{2\,i\,t} - 2\,\mathbf{i}\,c^2\,e^{-2\,i\,t}\,G + \mathbf{i}\,c\,e^{-i\,t}\,(2\,B + B\,c^2 + 2\,c\,G) + 8\,a\,t\big)$

$\mathbf{Sin}\big[\dfrac{t}{2}\big] + e^{\frac{i\,t}{2}}\,C[1]\,\mathbf{Sin}\big[\dfrac{t}{2}\big]\Big\}\Big\}$

In[•]:= $\mathbf{l[t]}$

Out[•]= $l[t]$

In[•]:= `sol₃ = DSolve[`

$$\left\{ l'[t] == 2\,\mathbb{i}\,a\,c + \mathbb{i}\,a\,c^3 - \frac{1}{2}\,\mathbb{i}\,B\,c^2\,e^{-\mathbb{i}\,t} - \frac{3}{2}\,\mathbb{i}\,b\,e^{\mathbb{i}\,t} + \mathbb{i}\,b\,c^2\,e^{\mathbb{i}\,t} - 3\,\mathbb{i}\,c\,e^{2\,\mathbb{i}\,t}\,g + \frac{\mathbb{i}\,l[t]}{2} - \frac{m[t]}{2}, \right.$$

$$\left. m'[t] == 2\,a\,c + a\,c^3 - \frac{3}{2}\,B\,c^2\,e^{-\mathbb{i}\,t} - \frac{5}{2}\,b\,e^{\mathbb{i}\,t} - b\,c^2\,e^{\mathbb{i}\,t} + c\,e^{2\,\mathbb{i}\,t}\,g + \frac{l[t]}{2} + \frac{\mathbb{i}\,m[t]}{2} \right\}, \{l[t],$$

`m[t]}, t]`

Out[•]= $\left\{ \left\{ l[t] \rightarrow \frac{1}{2}\,\mathbb{i}\,e^{\frac{\mathbb{i}\,t}{2}} \right. \right.$

$$\left(\mathbb{i}\,c\,(4\,a + B\,c + 2\,a\,c^2)\,e^{-\mathbb{i}\,t} - \mathbb{i}\,B\,c^2\,e^{-2\,\mathbb{i}\,t} + 2\,\mathbb{i}\,c\,e^{2\,\mathbb{i}\,t}\,g - \mathbb{i}\,e^{\mathbb{i}\,t}\,(b + 2\,b\,c^2 - 2\,c\,g) - 4\,b\,t \right)$$

$$\cos\left[\frac{t}{2}\right] + e^{\frac{\mathbb{i}\,t}{2}}\,C[1]\,\cos\left[\frac{t}{2}\right] - \frac{1}{2}\,e^{\frac{\mathbb{i}\,t}{2}}\left(\mathbb{i}\,c\,(4\,a - B\,c + 2\,a\,c^2)\,e^{-\mathbb{i}\,t} + \mathbb{i}\,b\,(1 + 2\,c^2)\,e^{\mathbb{i}\,t} - \right.$$

$$\left. \mathbb{i}\,B\,c^2\,e^{-2\,\mathbb{i}\,t} + 2\,\mathbb{i}\,c\,e^{\mathbb{i}\,t}\,g - 2\,\mathbb{i}\,c\,e^{2\,\mathbb{i}\,t}\,g - 4\,b\,t \right)\sin\left[\frac{t}{2}\right] - e^{\frac{\mathbb{i}\,t}{2}}\,C[2]\,\sin\left[\frac{t}{2}\right],$$

$$m[t] \rightarrow \frac{1}{2}\,e^{\frac{\mathbb{i}\,t}{2}}\left(\mathbb{i}\,c\,(4\,a - B\,c + 2\,a\,c^2)\,e^{-\mathbb{i}\,t} + \mathbb{i}\,b\,(1 + 2\,c^2)\,e^{\mathbb{i}\,t} - \mathbb{i}\,B\,c^2\,e^{-2\,\mathbb{i}\,t} + \right.$$

$$\left. 2\,\mathbb{i}\,c\,e^{\mathbb{i}\,t}\,g - 2\,\mathbb{i}\,c\,e^{2\,\mathbb{i}\,t}\,g - 4\,b\,t \right)\cos\left[\frac{t}{2}\right] + e^{\frac{\mathbb{i}\,t}{2}}\,C[2]\,\cos\left[\frac{t}{2}\right] + \frac{1}{2}\,\mathbb{i}\,e^{\frac{\mathbb{i}\,t}{2}}$$

$$\left(\mathbb{i}\,c\,(4\,a + B\,c + 2\,a\,c^2)\,e^{-\mathbb{i}\,t} - \mathbb{i}\,B\,c^2\,e^{-2\,\mathbb{i}\,t} + 2\,\mathbb{i}\,c\,e^{2\,\mathbb{i}\,t}\,g - \mathbb{i}\,e^{\mathbb{i}\,t}\,(b + 2\,b\,c^2 - 2\,c\,g) - 4\,b\,t \right)$$

$$\left. \left. \sin\left[\frac{t}{2}\right] + e^{\frac{\mathbb{i}\,t}{2}}\,C[1]\,\sin\left[\frac{t}{2}\right] \right\} \right\}$$

In[•]:= `V₂[t_] := l[t] /. sol₂[[1]]`

In[•]:= `v₂ := V₂[t]`

In[•]:= `v₂`

Out[•]= $-\frac{1}{2}\,\mathbb{i}\,e^{\frac{\mathbb{i}\,t}{2}}\left(\mathbb{i}\,(2\,a - b\,c + 4\,a\,c^2)\,e^{\mathbb{i}\,t} - \mathbb{i}\,b\,c\,e^{2\,\mathbb{i}\,t} - 2\,\mathbb{i}\,c^2\,e^{-2\,\mathbb{i}\,t}\,G + \mathbb{i}\,c\,e^{-\mathbb{i}\,t}\,(2\,B + B\,c^2 + 2\,c\,G) + 8\,a\,t \right)$

$$\cos\left[\frac{t}{2}\right] + e^{\frac{\mathbb{i}\,t}{2}}\,C[1]\,\cos\left[\frac{t}{2}\right] -$$

$$\frac{1}{2}\,e^{\frac{\mathbb{i}\,t}{2}}\left(-\mathbb{i}\,B\,c\,(2 + c^2)\,e^{-\mathbb{i}\,t} + \mathbb{i}\,b\,c\,e^{\mathbb{i}\,t} + 2\,\mathbb{i}\,a\,(1 + 2\,c^2)\,e^{\mathbb{i}\,t} - \mathbb{i}\,b\,c\,e^{2\,\mathbb{i}\,t} + \right.$$

$$\left. 2\,\mathbb{i}\,c^2\,e^{-\mathbb{i}\,t}\,G + 2\,\mathbb{i}\,c^2\,e^{-2\,\mathbb{i}\,t}\,G - 8\,a\,t \right)\sin\left[\frac{t}{2}\right] - e^{\frac{\mathbb{i}\,t}{2}}\,C[2]\,\sin\left[\frac{t}{2}\right]$$

In[•]:= `TrigReduce[%12]`

Out[•]= $\frac{1}{2}\left(2\,B\,c + B\,c^3 + 2\,a\,e^{\mathbb{i}\,t} + 4\,a\,c^2\,e^{\mathbb{i}\,t} - 2\,b\,c\,e^{2\,\mathbb{i}\,t} - 8\,\mathbb{i}\,a\,e^{\mathbb{i}\,t}\,t + C[1] + e^{\mathbb{i}\,t}\,C[1] - \mathbb{i}\,C[2] + \mathbb{i}\,e^{\mathbb{i}\,t}\,C[2] \right)$

In[•]:= `FullSimplify[`$\frac{1}{2}$`(2 B c + B c³ + 2 a e^{i t} + 4 a c² e^{i t} -`

`2 b c e^{2 i t} - 8 i a e^{i t} t + C[1] + e^{i t} C[1] - i C[2] + i e^{i t} C[2])]`

Out[•]= $\frac{1}{2}\left(B\,c\,(2 + c^2) - 2\,b\,c\,e^{2\,\mathbb{i}\,t} + C[1] + e^{\mathbb{i}\,t}\,(a\,(2 + 4\,c^2 - 8\,\mathbb{i}\,t) + C[1] + \mathbb{i}\,C[2]) - \mathbb{i}\,C[2] \right)$

In[•]:= `ExpandAll[v₂]`

Out[•]= $B c e^{-\frac{i t}{2}} \cos\left[\frac{t}{2}\right] + \frac{1}{2} B c^3 e^{-\frac{i t}{2}} \cos\left[\frac{t}{2}\right] + a e^{\frac{3 i t}{2}} \cos\left[\frac{t}{2}\right] - \frac{1}{2} b c e^{\frac{3 i t}{2}} \cos\left[\frac{t}{2}\right] +$

$2 a c^2 e^{\frac{3 i t}{2}} \cos\left[\frac{t}{2}\right] - \frac{1}{2} b c e^{\frac{5 i t}{2}} \cos\left[\frac{t}{2}\right] + c^2 e^{-\frac{i t}{2}} G \cos\left[\frac{t}{2}\right] - c^2 e^{-\frac{3 i t}{2}} G \cos\left[\frac{t}{2}\right] -$

$4 i a e^{\frac{i t}{2}} t \cos\left[\frac{t}{2}\right] + e^{\frac{i t}{2}} C[1] \cos\left[\frac{t}{2}\right] + i B c e^{-\frac{i t}{2}} \sin\left[\frac{t}{2}\right] + \frac{1}{2} i B c^3 e^{-\frac{i t}{2}} \sin\left[\frac{t}{2}\right] -$

$i a e^{\frac{3 i t}{2}} \sin\left[\frac{t}{2}\right] - \frac{1}{2} i b c e^{\frac{3 i t}{2}} \sin\left[\frac{t}{2}\right] - 2 i a c^2 e^{\frac{3 i t}{2}} \sin\left[\frac{t}{2}\right] + \frac{1}{2} i b c e^{\frac{5 i t}{2}} \sin\left[\frac{t}{2}\right] -$

$i c^2 e^{-\frac{i t}{2}} G \sin\left[\frac{t}{2}\right] - i c^2 e^{-\frac{3 i t}{2}} G \sin\left[\frac{t}{2}\right] + 4 a e^{\frac{i t}{2}} t \sin\left[\frac{t}{2}\right] - e^{\frac{i t}{2}} C[2] \sin\left[\frac{t}{2}\right]$

In[•]:= `v₂`

Out[•]= $-\frac{1}{2} i e^{\frac{i t}{2}} \left(i \left(2 a - b c + 4 a c^2\right) e^{i t} - i b c e^{2 i t} - 2 i c^2 e^{-2 i t} G + i c e^{-i t} \left(2 B + B c^2 + 2 c G\right) + 8 a t\right)$

$\cos\left[\frac{t}{2}\right] + e^{\frac{i t}{2}} C[1] \cos\left[\frac{t}{2}\right] -$

$\frac{1}{2} e^{\frac{i t}{2}} \left(-i B c \left(2 + c^2\right) e^{-i t} + i b c e^{i t} + 2 i a \left(1 + 2 c^2\right) e^{i t} - i b c e^{2 i t} +$

$2 i c^2 e^{-i t} G + 2 i c^2 e^{-2 i t} G - 8 a t\right) \sin\left[\frac{t}{2}\right] - e^{\frac{i t}{2}} C[2] \sin\left[\frac{t}{2}\right]$

In[•]:= `TrigReduce[%16]`

Out[•]= $\frac{1}{2} \left(2 B c + B c^3 + 2 a e^{i t} + 4 a c^2 e^{i t} - 2 b c e^{2 i t} - 8 i a e^{i t} t + C[1] + e^{i t} C[1] - i C[2] + i e^{i t} C[2]\right)$

In[•]:= `ExpandAll[%]`

Out[•]= $B c + \frac{B c^3}{2} + a e^{i t} + 2 a c^2 e^{i t} - b c e^{2 i t} - 4 i a e^{i t} t + \frac{C[1]}{2} + \frac{1}{2} e^{i t} C[1] - \frac{1}{2} i C[2] + \frac{1}{2} i e^{i t} C[2]$

In[•]:= `V₃[t_] := l[t] /. sol₃[[1]]`

In[•]:= `v₃ := V₃[t]`

In[•]:= `v₃`

Out[•]= $\frac{1}{2} i e^{\frac{i t}{2}} \left(i c \left(4 a + B c + 2 a c^2\right) e^{-i t} - i B c^2 e^{-2 i t} + 2 i c e^{2 i t} g - i e^{i t} \left(b + 2 b c^2 - 2 c g\right) - 4 b t\right)$

$\cos\left[\frac{t}{2}\right] + e^{\frac{i t}{2}} C[1] \cos\left[\frac{t}{2}\right] - \frac{1}{2} e^{\frac{i t}{2}}$

$\left(i c \left(4 a - B c + 2 a c^2\right) e^{-i t} + i b \left(1 + 2 c^2\right) e^{i t} - i B c^2 e^{-2 i t} + 2 i c e^{i t} g - 2 i c e^{2 i t} g - 4 b t\right)$

$\sin\left[\frac{t}{2}\right] - e^{\frac{i t}{2}} C[2] \sin\left[\frac{t}{2}\right]$

In[•]:= `TrigReduce[%21]`

Out[•]= $\frac{1}{2}$

$\left(-4 a c - 2 a c^3 + b e^{i t} + 2 b c^2 e^{i t} - 4 c e^{2 i t} g - 4 i b e^{i t} t + C[1] + e^{i t} C[1] - i C[2] + i e^{i t} C[2]\right)$

In[ ]:= `ExpandAll[%]`

Out[ ]= $-2 a c - a c^3 + \frac{1}{2} b \, \mathbb{e}^{\mathbb{i} t} + b c^2 \mathbb{e}^{\mathbb{i} t} - 2 c \, \mathbb{e}^{2 \mathbb{i} t} g -$

$2 \mathbb{i} b \, \mathbb{e}^{\mathbb{i} t} t + \frac{C[1]}{2} + \frac{1}{2} \mathbb{e}^{\mathbb{i} t} C[1] - \frac{1}{2} \mathbb{i} C[2] + \frac{1}{2} \mathbb{i} \, \mathbb{e}^{\mathbb{i} t} C[2]$

In[ ]:= `b := 0`

In[ ]:= `B := 0`

In[ ]:= v_3

Out[ ]= $\frac{1}{2} \mathbb{i} \, \mathbb{e}^{\frac{\mathbb{i} t}{2}} \left(\mathbb{i} c \left(4 a + 2 a c^2 \right) \mathbb{e}^{-\mathbb{i} t} + 2 \mathbb{i} c \, \mathbb{e}^{\mathbb{i} t} g + 2 \mathbb{i} c \, \mathbb{e}^{2 \mathbb{i} t} g \right) \text{Cos}\left[\frac{t}{2} \right] + \mathbb{e}^{\frac{\mathbb{i} t}{2}} C[1] \text{Cos}\left[\frac{t}{2} \right] -$

$\frac{1}{2} \mathbb{e}^{\frac{\mathbb{i} t}{2}} \left(\mathbb{i} c \left(4 a + 2 a c^2 \right) \mathbb{e}^{-\mathbb{i} t} + 2 \mathbb{i} c \, \mathbb{e}^{\mathbb{i} t} g - 2 \mathbb{i} c \, \mathbb{e}^{2 \mathbb{i} t} g \right) \text{Sin}\left[\frac{t}{2} \right] - \mathbb{e}^{\frac{\mathbb{i} t}{2}} C[2] \text{Sin}\left[\frac{t}{2} \right]$

In[ ]:= `TrigReduce[%26]`

Out[ ]= $\frac{1}{2} \left(-4 a c - 2 a c^3 - 4 c \, \mathbb{e}^{2 \mathbb{i} t} g + C[1] + \mathbb{e}^{\mathbb{i} t} C[1] - \mathbb{i} C[2] + \mathbb{i} \, \mathbb{e}^{\mathbb{i} t} C[2] \right)$

In[ ]:= `C[1] := 0`

    ... SetDelayed: Tag C in C[1] is Protected.

Out[ ]= `$Failed`

In[ ]:= $v_2 := B c + \frac{B c^3}{2} + a \, \mathbb{e}^{\mathbb{i} t} + 2 a c^2 \mathbb{e}^{\mathbb{i} t} - b c \, \mathbb{e}^{2 \mathbb{i} t} - 4 \mathbb{i} a \, \mathbb{e}^{\mathbb{i} t} t$

In[ ]:= v_2

Out[ ]= $a \, \mathbb{e}^{\mathbb{i} t} + 2 a c^2 \mathbb{e}^{\mathbb{i} t} - 4 \mathbb{i} a \, \mathbb{e}^{\mathbb{i} t} t$

In[ ]:= $v_3 := -2 a c - a c^3 + \frac{1}{2} b \, \mathbb{e}^{\mathbb{i} t} + b c^2 \mathbb{e}^{\mathbb{i} t} - 2 c \, \mathbb{e}^{2 \mathbb{i} t} g - 2 \mathbb{i} b \, \mathbb{e}^{\mathbb{i} t} t$

In[ ]:= v_3

Out[ ]= $-2 a c - a c^3 - 2 c \, \mathbb{e}^{2 \mathbb{i} t} g$

In[ ]:= $j_2 := \left(\text{Exp}[I * t] \right) * s + \left(a \, \mathbb{e}^{\mathbb{i} t} + 2 a c^2 \mathbb{e}^{\mathbb{i} t} - 4 \mathbb{i} a \, \mathbb{e}^{\mathbb{i} t} t \right) * s\text{^}3$

In[ ]:= $J_2 := \left(\text{Exp}[-I * t] \right) * s + \left(a \, \mathbb{e}^{-\mathbb{i} t} + 2 a c^2 \mathbb{e}^{-\mathbb{i} t} + 4 \mathbb{i} a \, \mathbb{e}^{-\mathbb{i} t} t \right) * s\text{^}3$

In[ ]:= $j_3 := c * s + \left(-2 a c - a c^3 - 2 c \, \mathbb{e}^{2 \mathbb{i} t} g \right) * s\text{^}3$

In[ ]:= $J_3 := c * s + \left(-2 a c - a c^3 - 2 c \, \mathbb{e}^{-2 \mathbb{i} t} * G \right) * s\text{^}3$

In[ ]:= $\rho := z_1 + Z_1 - z_2 Z_2 - G z_3^2 Z_2^2 - z_3 Z_3 - g z_2^2 Z_3^2 -$
$\left(B z_3 Z_2 + b z_2 Z_3 \right) \left(z_2 Z_2 - z_3 Z_3 \right) - a \left(z_2^2 Z_2^2 - 4 z_2 z_3 Z_2 Z_3 + z_3^2 Z_3^2 \right)$

In[•]:= ρ

Out[•]= $-\left(c\,s+\left(-2\,a\,c-a\,c^3-2\,c\,e^{2\,i\,t}\,g\right)s^3\right)\left(c\,s+\left(-2\,a\,c-a\,c^3-2\,c\,e^{-2\,i\,t}\,G\right)s^3\right)-$
$G\left(c\,s+\left(-2\,a\,c-a\,c^3-2\,c\,e^{2\,i\,t}\,g\right)s^3\right)^2\left(e^{-i\,t}\,s+s^3\left(a\,e^{-i\,t}+2\,a\,c^2\,e^{-i\,t}+4\,i\,a\,e^{-i\,t}\,t\right)\right)^2-$
$\left(e^{-i\,t}\,s+s^3\left(a\,e^{-i\,t}+2\,a\,c^2\,e^{-i\,t}+4\,i\,a\,e^{-i\,t}\,t\right)\right)\left(e^{i\,t}\,s+s^3\left(a\,e^{i\,t}+2\,a\,c^2\,e^{i\,t}-4\,i\,a\,e^{i\,t}\,t\right)\right)-$
$g\left(c\,s+\left(-2\,a\,c-a\,c^3-2\,c\,e^{-2\,i\,t}\,G\right)s^3\right)^2\left(e^{i\,t}\,s+s^3\left(a\,e^{i\,t}+2\,a\,c^2\,e^{i\,t}-4\,i\,a\,e^{i\,t}\,t\right)\right)^2-$
$a\left(\left(c\,s+\left(-2\,a\,c-a\,c^3-2\,c\,e^{2\,i\,t}\,g\right)s^3\right)^2\left(c\,s+\left(-2\,a\,c-a\,c^3-2\,c\,e^{-2\,i\,t}\,G\right)s^3\right)^2-\right.$
$4\left(c\,s+\left(-2\,a\,c-a\,c^3-2\,c\,e^{2\,i\,t}\,g\right)s^3\right)\left(c\,s+\left(-2\,a\,c-a\,c^3-2\,c\,e^{-2\,i\,t}\,G\right)s^3\right)$
$\left(e^{-i\,t}\,s+s^3\left(a\,e^{-i\,t}+2\,a\,c^2\,e^{-i\,t}+4\,i\,a\,e^{-i\,t}\,t\right)\right)\left(e^{i\,t}\,s+\right.$
$\left.s^3\left(a\,e^{i\,t}+2\,a\,c^2\,e^{i\,t}-4\,i\,a\,e^{i\,t}\,t\right)\right)+\left(e^{-i\,t}\,s+s^3\left(a\,e^{-i\,t}+2\,a\,c^2\,e^{-i\,t}+4\,i\,a\,e^{-i\,t}\,t\right)\right)^2$
$\left.\left(e^{i\,t}\,s+s^3\left(a\,e^{i\,t}+2\,a\,c^2\,e^{i\,t}-4\,i\,a\,e^{i\,t}\,t\right)\right)^2\right)+z_1+Z_1$

In[•]:= **ClearAll[z, Z]**

In[•]:= **z₂**

Out[•]= $e^{i\,t}\,s+s^3\left(a\,e^{i\,t}+2\,a\,c^2\,e^{i\,t}-4\,i\,a\,e^{i\,t}\,t\right)$

In[•]:= **z₂**

Out[•]= $e^{i\,t}\,s+s^3\left(a\,e^{i\,t}+2\,a\,c^2\,e^{i\,t}-4\,i\,a\,e^{i\,t}\,t\right)$

In[•]:= **D[ρ, z₂]**

⚫⚫⚫ General: $e^{i\,t}\,s+s^3\left(a\,e^{i\,t}+2\,a\,c^2\,e^{i\,t}-4\,i\,a\,e^{i\,t}\,t\right)$ is not a valid variable.

Out[•]= $\partial_{e^{i\,t}\,s+s^3\left(a\,e^{i\,t}+2\,a\,c^2\,e^{i\,t}-4\,i\,a\,e^{i\,t}\,t\right)}\left(-\left(c\,s+\left(-2\,a\,c-a\,c^3-2\,c\,e^{2\,i\,t}\,g\right)s^3\right)\right.$
$\left(c\,s+\left(-2\,a\,c-a\,c^3-2\,c\,e^{-2\,i\,t}\,G\right)s^3\right)-$
$G\left(c\,s+\left(-2\,a\,c-a\,c^3-2\,c\,e^{2\,i\,t}\,g\right)s^3\right)^2\left(e^{-i\,t}\,s+s^3\left(a\,e^{-i\,t}+2\,a\,c^2\,e^{-i\,t}+4\,i\,a\,e^{-i\,t}\,t\right)\right)^2-$
$\left(e^{-i\,t}\,s+s^3\left(a\,e^{-i\,t}+2\,a\,c^2\,e^{-i\,t}+4\,i\,a\,e^{-i\,t}\,t\right)\right)\left(e^{i\,t}\,s+s^3\left(a\,e^{i\,t}+2\,a\,c^2\,e^{i\,t}-4\,i\,a\,e^{i\,t}\,t\right)\right)-$
$g\left(c\,s+\left(-2\,a\,c-a\,c^3-2\,c\,e^{-2\,i\,t}\,G\right)s^3\right)^2\left(e^{i\,t}\,s+s^3\left(a\,e^{i\,t}+2\,a\,c^2\,e^{i\,t}-4\,i\,a\,e^{i\,t}\,t\right)\right)^2-$
$a\left(\left(c\,s+\left(-2\,a\,c-a\,c^3-2\,c\,e^{2\,i\,t}\,g\right)s^3\right)^2\left(c\,s+\left(-2\,a\,c-a\,c^3-2\,c\,e^{-2\,i\,t}\,G\right)s^3\right)^2-\right.$
$4\left(c\,s+\left(-2\,a\,c-a\,c^3-2\,c\,e^{2\,i\,t}\,g\right)s^3\right)\left(c\,s+\left(-2\,a\,c-a\,c^3-2\,c\,e^{-2\,i\,t}\,G\right)s^3\right)$
$\left(e^{-i\,t}\,s+s^3\left(a\,e^{-i\,t}+2\,a\,c^2\,e^{-i\,t}+4\,i\,a\,e^{-i\,t}\,t\right)\right)\left(e^{i\,t}\,s+\right.$
$\left.s^3\left(a\,e^{i\,t}+2\,a\,c^2\,e^{i\,t}-4\,i\,a\,e^{i\,t}\,t\right)\right)+\left(e^{-i\,t}\,s+s^3\left(a\,e^{-i\,t}+2\,a\,c^2\,e^{-i\,t}+4\,i\,a\,e^{-i\,t}\,t\right)\right)^2$
$\left.\left.\left(e^{i\,t}\,s+s^3\left(a\,e^{i\,t}+2\,a\,c^2\,e^{i\,t}-4\,i\,a\,e^{i\,t}\,t\right)\right)^2\right)+z_1+Z_1\right)$