# Problem #1)
This starter has 3 variables

In[∘]:= `Clear["Global`*"]`

In[∘]:= `(* Put your eigenvectors here`
`    THESE ARE ALL FAKE NUMBERS`
`*)`

`ev1 = {1, 2, -3};`
`ev2 = {1, 2, -3};`
`ev3 = {1, 2, -3};`
`(* and the three eigenvalues here`
`   NOTE: w2 is w² in my notation *)`
`sol = {{w2 -> 1}, {w2 -> 2}, {w2 -> 3}}`

Out[∘]= ${w2 \rightarrow 1}, {w2 \rightarrow 2}, {w2 \rightarrow 3}$

Part B Look at motion

In[∘]:= `values = {k → 1, m → 1};`

In[∘]:= `mode1 = ev1 Exp[I w t] /. {w → Sqrt[w2]} /. sol[[1]]`

Out[∘]= $\left\{ e^{i\,t},\ 2\,e^{i\,t},\ -3\,e^{i\,t} \right\}$

In[∘]:= `mode2 = ev2 Exp[I w t] /. {w → Sqrt[w2]} /. sol[[2]]`

Out[∘]= $\left\{ e^{i\,\sqrt{2}\,t},\ 2\,e^{i\,\sqrt{2}\,t},\ -3\,e^{i\,\sqrt{2}\,t} \right\}$

In[∘]:= `mode3 = ev3 Exp[I w t] /. {w → Sqrt[w2]} /. sol[[3]]`

Out[∘]= $\left\{ e^{i\,\sqrt{3}\,t},\ 2\,e^{i\,\sqrt{3}\,t},\ -3\,e^{i\,\sqrt{3}\,t} \right\}$

In[•]:= **Plot[mode1 + {-2, 0, 2} /. values // Re, {t, 0, 10}]**

Out[•]=
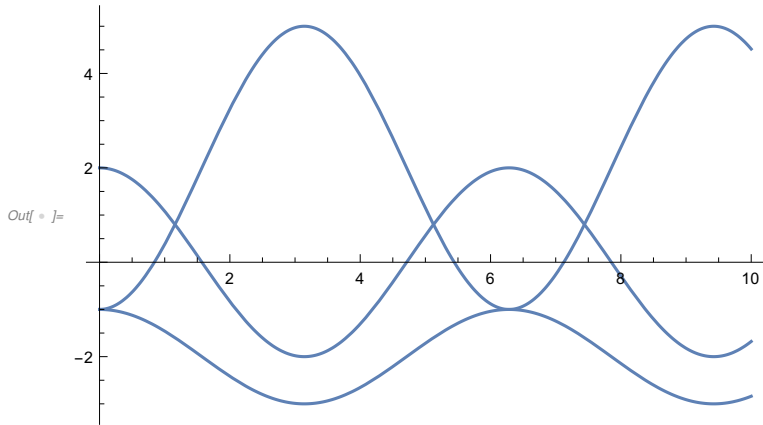
In[•]:= **Plot[mode2 + {-2, 0, 2} /. values // Re, {t, 0, 10}]**

Out[•]=
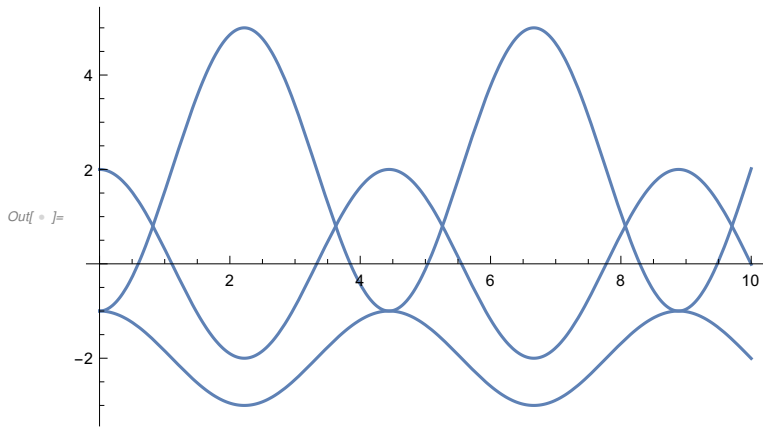
In[•]:= **Plot[mode3 + {-2, 0, 2} /. values // Re, {t, 0, 10}]**

Out[•]=
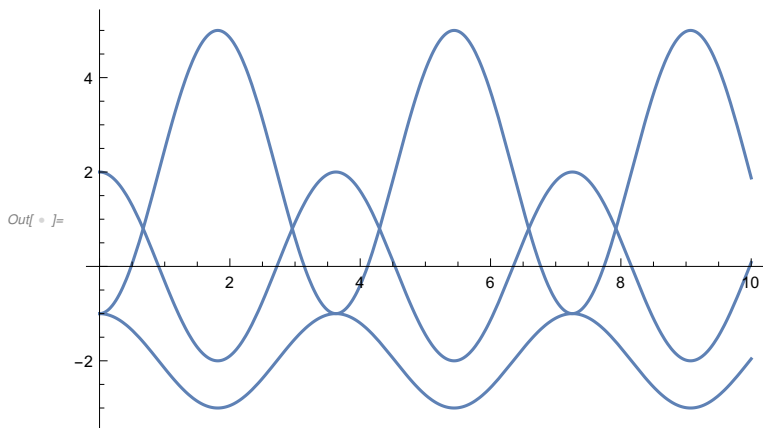
In[◦]:= `Plot[`$\frac{1}{2}$` mode1 + `$\frac{1}{4}$` mode2 + `$\frac{1}{4}$` mode3 +{-2, 0, 2}/. values // Re, {t, 0, 10}]`

Out[◦]=
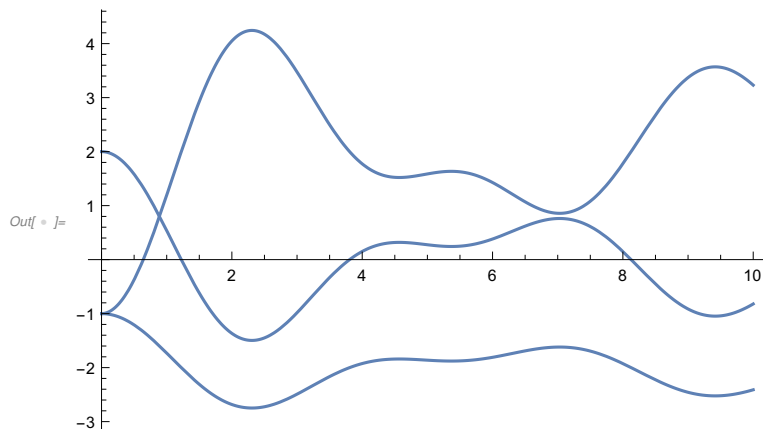
Problem #2,3,4,5,6)
This starter has 2 variables

In[◦]:= `Clear["Global`*"]`

In[◦]:= `(* Put your eigenvectors here`
`    THESE ARE ALL FAKE NUMBERS`
`*)`

`ev1 = {1, 2};`
`ev2 = {1, -2};`
`(* and the three eigenvalues here`
`  NOTE: w2 is w`^{2}`  in my notation *)`
`sol = {{w2 -> 1}, {w2 -> 2}}`

Out[◦]= `{{w2 → 1}, {w2 → 2}}`

### Part B Look at motion

In[◦]:= `values = {k → 1, m → 1};`

In[◦]:= `mode1 = ev1 Exp[I w t] /. {w → Sqrt[w2]} /. sol[[1]]`

Out[◦]= $\left\{e^{i\,t},\ 2\,e^{i\,t}\right\}$

In[◦]:= `mode2 = ev2 Exp[I w t] /. {w → Sqrt[w2]} /. sol[[2]]`

Out[◦]= $\left\{e^{i\,\sqrt{2}\,t},\ -2\,e^{i\,\sqrt{2}\,t}\right\}$

In[ ]:= `Plot[mode1 +{-2, 2}/. values // Re, {t, 0, 10}]`

Out[ ]=
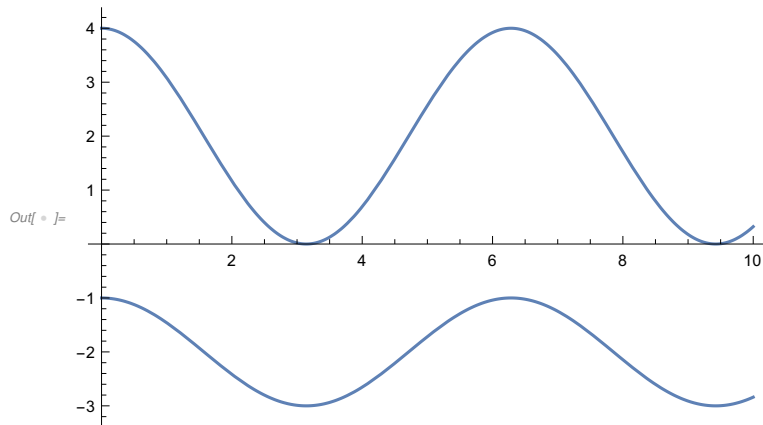
In[ ]:= `Plot[mode2 +{-2, 2}/. values // Re, {t, 0, 10}]`

Out[ ]=
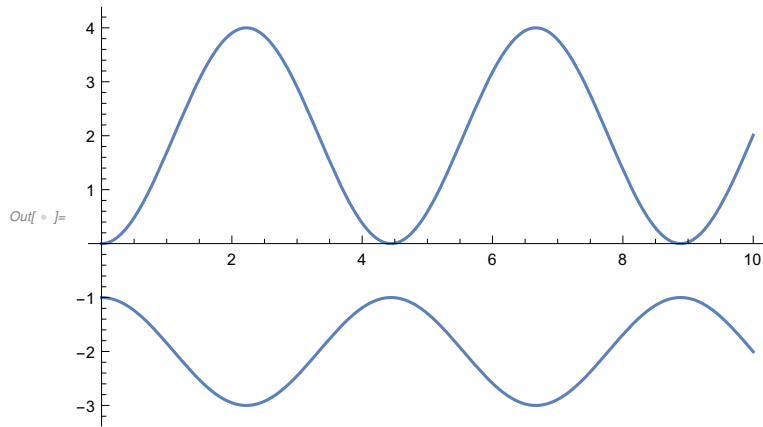
In[ ]:= `Plot[` $\frac{2}{3}$ `mode1 +` $\frac{1}{3}$ `mode2 +{-2, 2}/. values // Re, {t, 0, 10}]`

Out[ ]=