1  /  a) Solve the DE and plot the solution in the interval \([ 0, 65]\)

\[ y'' + 9y = \cos(2.8t), \, y(0) = 0, \, y'(0) = 0 \]

*Notice the beat from the graph.*

b) Solve the DE and plot the solution in the interval \([0, 50\pi]\)

\[ y'' + 9y = \cos(3t), \, y(0) = 0, \, y'(0) = 0 \]

*Notice the resonance from the graph*

2  / Using the "laplace" command, solve the IVP and plot the solution in the interval

**interval** \([0, 90]\)

\[ y'' + 0.2y' + y = 9\text{Dirac}(t - 4\pi) + 9\text{Dirac}(t-16\pi), \, y(0) = 0, \, y'(0) = 0. \]

3/  a) Find the eigenvalues and eigenvectors of the matrix \(A = \begin{pmatrix} -1.2 & 2.21 \\ -1 & 1 \end{pmatrix}\)

b) Solve the IVP \(X' = AX, \, X(0) = \begin{pmatrix} 1.1 \\ 1 \end{pmatrix}\)

c) Plot the solution, as a parametric curve, from \(t = 0\), to \(t = 10\pi\)

4 / Solve the system \(X' = \begin{pmatrix} 1 & -1 \\ 1 & 3 \end{pmatrix}X, \, X(0) = \begin{pmatrix} 1 \\ 0 \end{pmatrix}\)

and plot the solution, as a parametric curve, from \(t = 0\), to \(t = 0.65\).