APPM 2460 Homework 11: Visualizing Beats and Resonance

1. Write a differential equation such that the system exhibits BEATS.
   (a) Solve the system with the initial condition $y(0) = 1$, $y'(0) = 0$.
   (b) Use the SUBPLOT command to create one figure with two separate plots:
   On top, plot the homogeneous solution and the particular solution together for $0 \leq t \leq 20$.
   Below, plot the general solution $y(t) = y_h + y_p$ for $0 \leq t \leq 20$.
   (c) What do you notice about the solution? Is this consistent with your understanding of beats?

2. Write a differential equation such that the system exhibits RESONANCE.
   (a) Solve the system with the initial condition $y(0) = 1$, $y'(0) = 0$.
   (b) Use the SUBPLOT command to create one figure with two separate plots:
   On top, plot the homogeneous solution and the particular solution together for $0 \leq t \leq 20$.
   Below, plot the general solution $y(t) = y_h + y_p$ for $0 \leq t \leq 20$.
   (c) What do you notice about the solution? Is this consistent with your understanding of resonance?