HOMEWORK 12
DUE: MONDAY, JUNE 22

Solve the following initial value problems:

a) $y'' - 2y' + 4y = 0$, $y(0) = 2, y'(0) = 0$

b) $y'' - 2y' + 2y = 0$, $y(0) = 0, y'(0) = 1$

c) $y'' - 2y' + 2y = \cos t$, $y(0) = 1, y'(0) = 0$

d) $y'' - 2y' + 2y = e^{-t}$, $y(0) = 0, y'(0) = 1$

e) $y^{(4)} - y = 0$, $y(0) = 0, y'(0) = 0, y''(0) = 0, y'''(0) = 1$

f) $y'' + \omega^2 y = \cos 2t, (\omega^2 \neq 4)$, $y(0) = 1, y'(0) = 0$

Draw graphs of the non-homogenous part of the following DE's and solve the IVP's

1) $y'' + 2y' + 2y = \begin{cases} 1 & \text{if } \pi \leq t < 2\pi \\ 0 & \text{else} \end{cases}$, $y(0) = 0, y'(0) = 1$

2) $y'' + y = \begin{cases} t/2 & \text{if } 0 \leq t < 6 \\ 3 & \text{else} \end{cases}$, $y(0) = 0, y'(0) = 1$

3) $y'' + y' + \frac{5}{4}y = \begin{cases} \sin t & \text{if } 0 \leq t < \pi \\ 0 & \text{else} \end{cases}$, $y(0) = 0, y'(0) = 0$

4) $y'' + 4y = u(t - \pi) - u(t - 3\pi)$, $y(0) = 0, y'(0) = 0$

5) $y'' + 2y' + 2y = \delta(t - \pi)$, $y(0) = 1, y'(0) = 0$

6) $y'' + 2y' + 2y = \cos t + \delta(t - \pi/2)$, $y(0) = 0, y'(0) = 0$

7) $y'' + y = u(t - \pi/2) + 2\delta(t - 3\pi/2) - u(t - 2\pi)$, $y(0) = 0, y'(0) = 0$

8) $y^{(4)} - y = \delta(t - 1)$, $y(0) = 0, y'(0) = 0, y''(0) = 0, y'''(0) = 0$

9) $y'' + y = \sum_{k=1}^{20} \delta(t - k\pi/2)$, $y(0) = 0, y'(0) = 0$