Home Work 4

Due 8m Oct

① Solve the following 2nd order equation

ⓐ $\dfrac{d^2y}{dt^2} + 15\dfrac{dy}{dt} + 50y = e^{-15t} + \sin t$

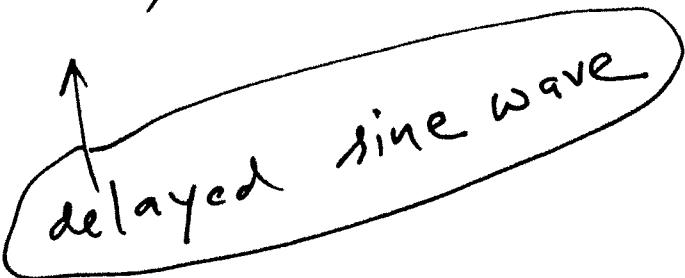ⓑ $\dfrac{d^2y}{dt^2} + 15\dfrac{dy}{dt} + 50y = f(t)$

where

$$f(t) = 100 \qquad 0 \le t < T$$
$$ = 0 \qquad t \ge T$$

ⓒ $\dfrac{d^2y}{dt^2} + 15\dfrac{dy}{dt} + 50y = f(t)$

where

$$f(t) = 0, \qquad 0 \le t < T$$
$$ = \sin(t - T), \qquad t \ge T$$

delayed sine wave

② Solve

$$\frac{d^2 y}{dt^2} + y = \sin t$$

$$y(0) = 1, \quad \dot{y}(0) = \frac{1}{2}.$$

for $y(t)$.

Using a graphing calculator or a super computer plot the graph of $y(t)$ vs t and see that $y(t)$ is unbounded as t is large.

Remark: The phenomenon illustrated in this problem is called "resonance".