Recitation 11, March 16, 2006

Superposition, Frequency Response

1. Find a particular solution for $\ddot{x} + 4x = \sin(2t)$.

2. Find a particular solution for $\ddot{x} + 4x = 1$, and then find the general solution for $\ddot{x} + 4x = 3 + 2\sin(2t)$.

The following problems consider the frequency response of the first order equation $\dot{x} + x = \cos(\omega t)$.

3. Express the amplitude of the sinusoidal system response to $\dot{x} + x = \cos(\omega t)$ as a function of ω.

4. Sketch the graph of this function of ω (for $\omega \geq 0$).

5. At what circular frequency is the amplitude of the system response just half that of the input signal?

6. What is the value of ω for which the phase lag is $\pi/4$?