

**THE DEPARTMENT OF MECHANICAL & AEROSPACE ENGINEERING**  
**UNIVERSITY AT BUFFALO**  
**MAE 340: Systems Analysis, Spring 2003**  
**Homework 1, Due: January 21, 2003**

For each problem:

- a) Find  $x_H(t)$
- b) Find  $x_p(t)$
- c) Find  $x(t)$  [using initial conditions]
- d) Sketch  $x(t)$  for  $0 \leq t \leq 20$

$$1. \quad \ddot{x} + 4\dot{x} + 29x = 5 + 2t \quad \begin{cases} x(0) = 0 \\ \dot{x}(0) = 1 \end{cases}$$

$$2. \quad \ddot{x} + 3\dot{x} + 2x = 4 \quad \begin{cases} x(0) = 5 \\ \dot{x}(0) = 0 \end{cases}$$

$$3. \quad \ddot{x} + 6\dot{x} + 8x = 3 \sin(3t) \quad \begin{cases} x(0) = 0 \\ \dot{x}(0) = 0 \end{cases}$$