

# Homework Assignment 10 in Differential Equations, MATH308-SUMMER 2012

due June 25, 2012

Topics covered : *forced vibration; method of variation of parameters (correspond to sections 3.8 and 3.6 in the textbook)*

1. A spring is stretched 6 in by a mass that weighs 4 lb. The mass is attached to a dashpot mechanism that has a damping constant of  $1 \frac{\text{lb}\cdot\text{s}}{\text{ft}}$  and is acted on by an external force of  $4 \cos 2t$  lb. In both items below you can use the relevant formulas from section 3.8.
  - (a) Determine the steady state solution of this system;
  - (b) If the external force is  $4 \cos \omega t$ , determine the frequency  $\omega > 0$  for which the amplitude of the steady state solution is maximal.
2. Use the method of variation of parameter to find the general solution of the given differential equation:
  - (a)  $y'' - y' - 12y = 2e^{-3t}$ ;
  - (b)  $y'' + y = \frac{1}{\cos t}$ ,  $-\frac{\pi}{2} < t < \frac{\pi}{2}$ .