Math 30
Homework
January 24, 2005

The solutions to these problems are due at the beginning of class on Wednesday, January 26.


1. For each initial value problem below, do the following:
   (i) Verify that $y_1(t)$ and $y_2(t)$ are solutions to the differential equation.
   (ii) Show that $y_1(t)$ and $y_2(t)$ are linearly independent.
   (iii) Find the solution to the initial value problem.

   (a) $y'' - 4y' + 4y = 0$, $y(0) = -1$, $y'(0) = 1$; $y_1(t) = te^{2t}$, $y_2(t) = e^{2t}$

   (b) $y'' - 5y' + 6y = 0$, $y(0) = 3$, $y'(0) = 10$; $y_1(t) = e^{2t}$, $y_2(t) = e^{3t}$

   (c) $y'' - 4y' + 5y = 0$, $y(\pi) = 0$, $y'(\pi) = -4e^{2\pi}$; $y_1(t) = e^{2t} \sin t$, $y_2(t) = e^{2t} \cos t$

2. Do problems 20a, 21, and 22 on pp. 163-164. (Note: a mass-spring system is an example of a harmonic oscillator.)