Due Thursday, March 23 at the beginning of class.

1. Find the general solution of the differential equation using the method of variation of parameters.
   (a) $y'' + 9y = 9\sec^2(3t)$, $0 < t < \pi/6$
   (b) $y'' - 2y' + y = \dfrac{e^t}{1+t^2}$
2. Verify that the given functions y_1 and y_2 satisfy the corresponding homogeneous equation; then use variation of parameters to find a particular solution of the given nonhomogeneous equation.
   (a) $t^2y'' - 2y = 3t^2 - 1$, $t > 0$, $y_1(t) = t^2$, $y_2(t) = t^{-1}$
   (b) $ty'' - (1+t)y' + y = t^2e^{2t}$, $t > 0$, $y_1(t) = 1 + t$, $y_2(t) = e^t$
3. A mass weighing 100 g stretches a spring 5 cm. If the mass is set in motion from its equilibrium position with a downward velocity of 10 cm/s, and if there is no dumping, determine the position of the mass at any time t. When does the mass first return to its equilibrium position?
4. A mass weighing 3 lb stretches a spring 3 in. If the mass is pushed upward, contracting the spring a distance of 1 in, and then set in the motion with a downward velocity of 2 ft/s, and if there is no damping, find the the position y of the mass at any time t. Determine the frequency, period, amplitude and phase of the motion.
5. A certain vibrating system satisfies the equation $y''+\gamma y'+y = 0$. Find the value of the damping coefficient γ for which the quasi period of the damped motion is 50% greater than the period of the corresponding undamped motion.