1. Find the solution to the given initial value problem.

   (a) $y'' + 10y' + 25y = 0, \qquad y(0) = 2, \quad y'(0) = -1.$

(b) $y'' + 9y = 0, \qquad y(0) = -2, \quad y'(0) = 3.$

(c) $y'' - 2y' + 5y = 0 \qquad y(\pi/2) = 0, \quad y'(\pi/2) = 2.$

2. Use the method of reduction of order to find a fundamental set of solutions.

(a) $t^2 y'' + 2ty' - 2y = 0, \qquad t > 0, \quad y_1(t) = t.$

(b) $(t-1)y'' - ty' + y = 0, \qquad t > 0, \quad y_1(t) = e^t.$

3. Verify that the functions y_1 and y_2 are solutions of the given differential equation. Do they constitute a fundamental set of solution

   (a) $x^2y'' - x(x+2)y' + (x+2)y = 0, \qquad x > 0 \quad y_1(x) = x, \quad y_2(x) = xe^x.$

   (b) $y'' + 4y = 0, \qquad y_1 = 2\sin x^2 - 1, \quad y_2 = 3\sin^2 x - \cos^2 x - 1.$

4. If the Wronskian of f and g is $3e^{4t}$ and $f(t) = e^{2t}$, find $g(t)$.

5. If the Wronskian of f and g is $t\cos t - \sin t$, and if $u = 2f - 3g$, and $v = f + g$, Find the Wronskian of u and v.

6. Find the general solution to the following equations

   (a) $y'' - y' = t$

(b) $y'' - 2y' - 3y = 3te^{2t}$.

(c) $y'' - 2y' - 3y = -3e^{-t}$.