Mathematical Methods II
Weekly problem set 3

(1) Use the method of Laplace transforms to solve

$$y'' + 5y' + 6y = 0,$$

subject to the boundary condition $y(0) = 1$, $y'(0) = -4$.

(2) Consider the following differential equation

$$y'' + 3y' + 2y = 10\cos(x).$$

(a) Compute the complementary function,

$$y_c(x) = c_1 y_1(x) + c_2 y_2(x).$$

(b) Use the Wronskian method to solve the inhomogeneous problem. *Hint*: if $y_p = c_1(x)y_1(x) + c_2(x)y_2(x)$, then $c_1' = -\frac{h(x)}{W(x)}y_2$ and $c_2' = \frac{h(x)}{W(x)}y_1$ where W is the Wronskian and h is the inhomogeneous term.