EE3054 - Homework 11 - Due Nov. 18 2005

1. Find the Laplace transforms of the following signals and indicate the regions of convergence:

   (a) \( e^{2t}u(t) \)
   (b) \( \sin(t)\cos(t)u(t) \)

2. Find the Laplace transform of \( e^{\alpha t}\cos(\omega t)u(t) \) using the following facts:
   - The Laplace transform of \( \cos(\omega t)u(t) \) is \( \frac{s}{s^2 + \omega^2} \).
   - If the Laplace transform of \( x(t) \) is \( X(s) \), then the Laplace transform of \( e^{\alpha t}x(t) \) is \( X(s - \alpha) \).

3. Using one-sided Laplace transforms, solve the following differential equations with the given input signals and initial conditions:

   (a) \( \ddot{y}(t) + y(t) = x(t), x(t) = \sin(t), y(0) = 1, \dot{y}(0) = 0 \)
   (b) \( \ddot{y}(t) + 2\dot{y}(t) + y(t) = x(t), x(t) = e^{-2t}, y(0) = 0, \dot{y}(0) = 1 \).