ELEC 312 - Systems I
Homework Assignment 1

Due Friday, January 30, 2015 for Section 01
Due Wednesday, January 28, 2015 for Section 81

1. Obtain the Laplace transforms of the following functions using the provided tables of Laplace transform pairs and properties:

   (a) $f(t) = (1 - e^{-t} - te^{-t})\, u(t)$

   (b) $f(t) = te^{-t} \cos(t)\, u(t)$

   Simplify your answer as much as possible. Do **not** use the Laplace integral.

2. Given

$$F(s) = \frac{1}{s^2 + 2s},$$

   determine the values of

   (a) $\lim_{t \to 0} f(t)$

   (b) $\lim_{t \to \infty} f(t)$

   (c) $\lim_{t \to 0} f'(t)$

   (d) $\lim_{t \to \infty} f'(t)$

   by using the differentiation property, the initial value theorem, and the final value theorem **only**.

3. **By hand**, find the inverse Laplace transform of

$$F(s) = \frac{s + 1}{s\,(s^2 + 2s + 10)}.$$

4. **Using MATLAB**, obtain the partial-fraction expansion of

$$F(s) = \frac{10(s + 2)(s + 4)}{(s + 1)(s + 3)(s + 5)^2}$$

   and obtain the inverse Laplace transform of $F(s)$.