Math 201, Assignment 4
Due at the beginning of tutorial on July 15, 2015
Illegible or disorganized solutions will receive no credit! Please, for the sake of our markers, be neat!

1) Evaluate the following Laplace Transforms using the table in the textbook.

   a)
   $$\mathscr{L}\{t^3 - sinh(2t)\}$$

   b)
   $$\mathscr{L}\{(t-2)^2 e^{4t}\}$$

   c)
   $$\mathscr{L}\{sin^2(kt)\}$$

   d)
   $$\mathscr{L}\{x(t)\}$$

   where

$$x(t) = \begin{cases} 1 & 0 \le t < 2 \\ 2 & 2 \le t < 4 \\ 0 & t \ge 4 \end{cases}$$

2) Show that all bounded functions are of exponential order. [A function $f(x)$ is bounded if there exists an $M > 0$ such that $|f(x)| \le M$ for all x in $\mathbb{R}$.]

3) Evaluate the following inverse Laplace Transforms

   a)
   $$\mathscr{L}^{-1}\left\{\frac{s^2}{(s+1)^3}\right\}$$

   b)
   $$\mathscr{L}^{-1}\left\{\frac{1}{s^2+4s+10}\right\}$$

4) Use the Laplace Transform to solve the following initial value problem.

$$y'' + 4y = e^{-t}, \quad y(0) = 2,\ y'(0) = 1$$