Math 307 - Homework 6 - Dr. Loveless

The problems refer to the 10th edition of the book. Hand in your work in the order it is assigned (Staple all your work together before coming to class). This is a minimal list of problems, I strongly encourage you to do more problems than are assigned.

1. 6.1/3, 4, 15, 21, 24
2. 6.2/1, 2, 3, 8, 9, 11, 13, 16, 18
3. And complete the following two additional problems:

   A. Consider $y'' - 4y = 0$ with $y(0) = 6$ and $y'(0) = 0$.
   The solution is: $y(t) = 3e^{-2t} + 3e^{2t}$. (You could get this with Chapter 3 methods).
      i. Compute the Laplace transform: $\mathcal{L}\{3e^{-2t} + 3e^{2t}\}$.
      ii. Compute the Laplace transform of both sides of $y'' - 4y = 0$ and solve for $\mathcal{L}\{y\}$.
      iii. Use partial fractions to decompose your answer from the previous part (verify that both parts match).

   B. Consider $y'' - 2y' + 5y = 0$ with $y(0) = 1$ and $y'(0) = 5$.
   The solution is $y(t) = e^t \cos(2t) + 2e^t \sin(2t)$. (You could get this with Chapter 3 methods).
      i. Compute the Laplace Transform: $\mathcal{L}\{e^t \cos(2t) + 2e^t \sin(2t)\}$
      ii. Take the Laplace Transform of both sides of $y'' - 2y' + 5y = 0$ and solve for $\mathcal{L}\{y\}$.
      iii. Use partial fractions to decompose your answer from the previous part (verify that both parts match).

NOTES AND SPECIAL INSTRUCTIONS :

- Problems 6.1/3,4: Continuous means it can be drawn without lifting your pen. Piecewise continuous means is has a finite number of discontinuities and the function approaches a finite limit on either side of each discontinuity (*i.e.* it only has a finite number of "jump" discontinuities, in particular it has no vertical asymptotes). The problem wants you to draw the picture and detemine if it is continuous, piecewise continuous, or neither. We will be working extensively with piecewise continuous functions in 6.3 and 6.4. If you find these problems to be difficult, also attempt problems 1 and 2 for more practice.
- Problems 6.2/1,2,3,8,9: Use partial fractions, then look up the inverse Laplace transform in the given table. These problems primarily will give you a refresher with partial fractions. I strongly encourage you to work through my partial fractions review before attempting these. If these are hard for you, then attempt all of problems 1-10 in this section for more practice.