Math 308: Week-in-Review 7

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1. Use the definition to find the Laplace transforms of

   (a) $f(t) = e^{at}$, where a is a nonzero real number.

   (b) $f(t) = \cos(bt)$, where b is a nonzero real number.

(c) $f(t) = \begin{cases} 2t+1, & 0 \le t < 2, \\ 3t, & t \ge 2. \end{cases}$

(d) $f(t) = t$

(e) $f(t) = t^2$

2. Find the inverse Laplace transform of the following functions

(a) $F(s) = \dfrac{4}{(s-2)^5}$

(b) $F(s) = \dfrac{8s^2 - 4s + 12}{s(s^2+4)}$

(c) $F(s) = \dfrac{2s-3}{s^2+2s+10}$

3. Use the Laplace transform to solve the initial value problem

$$y'' + 3y' + 2y = 4t, \quad y(0) = 1, \quad y'(0) = 0.$$

4.

$$y'' + 9y = \cos 3t, \quad y(0) = 0, y'(0) = 1.$$

5.

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