Exercise 5

1. In each of the following functions, find the Laplace transform of the function.

   (a) $f(t) = t\cos(4t)$

   (b) $f(t) = te^{-at}$

   (c) $f(t) = \cos^2(2t)$

2. Find the inverse Laplace transform for each of the following functions.

   (a) $\dfrac{3}{s^2 + s/4}$.

   (b) $\dfrac{1}{s(s^2 + \omega^2)}$

   (c) $\dfrac{1}{s^4 - s^2}$

   (d) $\dfrac{s+1}{s^4 + 9s^2}$

   (e) $\dfrac{1}{s^3 + as^2}$

3. Solve the following IVPs.

   (a) $y'' - y' - 6y = 0, y(0) = 11, y'(0) = 28.$

   (b) $y'' + 9y = 10e^{-t}, y(0) = 0, y'(0) = 0$

   (c) $y'' - 4y' + 3y = 6t - 8, y(0) = 0, y'(0) = 1$