# Spring 2021 Math 20D Lecture B Homework #6

Due Sunday, 11:59pm, May 16th

Submit this homework through Gradescope.
**Topics covered: section 7.6, 7.7/7.8**

1. Express the given function using window and step functions and then compute its Laplace transform.
$$g(t) = \begin{cases} 0, & t \in [0, 2), \\ t + 1, & t \in [2, \infty). \end{cases}$$

2. Solve the given initial value problem using the method of Laplace transforms.
$$y'' + y = u(t - 3), \quad y(0) = 0,\ y'(0) = 1.$$

3. Use the convolution theorem to compute
$$\mathscr{L}^{-1}\{\frac{1}{(s^2 + 4)^2}\}.$$

4. Solve the integro-differential equation for $y(t)$:
$$y'(t) - 2\int_0^t e^{t-\tau} y(\tau) d\tau = t, \quad y(0) = 2.$$