Quiz #3 (EngMath I) [Wednesday, October 11, 2017]

Name: _____ **Dept:** _____ **ID No:** _____

1. (7 points) Find the following convolutions
   (a) (2 points) $1 * 1$
   (b) (3 points) $1 * 1 * 1$
   (c) (2 points) $1 * 1 * 1 * \cdots * 1$ (n factors)

2. (8 points) Find the Laplace transform of the following function:

$$t \int_0^t \tau \cos \tau d\tau$$

3. (15 points) Using Laplace transforms, solve the following initial value problem:

$$y'' + y = h(t), \quad y(0) = 1,\ y'(0) = 0,$$

where

$$h(t + 2\pi) = h(t) = \begin{cases} 1, & \text{if } 0 \le t \le \pi, \\ 0, & \text{if } \pi < t < 2\pi. \end{cases}$$

4. (20 points) Using Laplace transforms, solve the following initial value problem:

$$y'' - 2y' + 5y = e^t, \quad y(\pi) = 2,\ y'(\pi) = 3.$$