

Due Thursday, April 6 at the beginning of class.

1. Find the Laplace transform of the given function

$$(a) f(t) = \begin{cases} 0, & 0 \leq t < 1, \\ 6t - 5, & 1 \leq t < 3, \\ t^2, & t \geq 3. \end{cases}$$

$$(b) f(t) = t^2 u_2(t)$$

$$(c) f(t) = e^t u_1(t)$$

2. Find the inverse Laplace transform of

$$(a) \frac{e^{-2s} - 3e^{-7s}}{(s+5)^2}$$

$$(b) \frac{(s-2)e^{-s}}{s^2 - 4s + 3}$$

$$(c) \frac{e^{-s}(3s^2 - s + 2)}{(s-1)(s^2 + 1)}$$

3. Solve the initial value problem using the method of Laplace transform.

$$(a) y'' + y = g(t), y(0) = 0, y'(0) = 1, g(t) = \begin{cases} t/2, & 0 \leq t < 6, \\ 3, & t \geq 6. \end{cases}$$

$$(b) y'' + y' + \frac{5}{4}y = t - u_{\pi/2}(t) \left(t - \frac{\pi}{2}\right), y(0) = y'(0) = 0$$