Tufts University

EE105 Feedback Control Systems, Fall 2018  
Prof. Brian Aull

Homework #2 Due Monday, September 24

1. **RL circuit step response**. Finish the problem we started at the end of session 4.

(a) Use Laplace transforms to find an expression for the inductor current iL(t).

(b) Plot the current for L = 75 nH and R = 50 .

2. Find the Laplace transform of each of the following time functions. In each case, assume the function is zero for t<0. In some cases, there is suggested short cut using Laplace transforms corresponding to mathematical operations. (See Table A.1 in Appendix A of the text)

(a)

(b)

(c) cosh(3t)

(d) t cosh(3t) [Multiplication by time]

(e) [Shift in frequency]

(f) [Time scaling]

(g) (t-5)2 u(t-5) [Time delay. Notice that the unit step must also be delayed for the theorem to work.]

3. Find the inverse Laplace transform of each of the following functions:

(a) (b) (c) (d)

4. Simplify the following block diagram to a single block using block diagram algebra manipulations. Write the correct overall transfer function.

