ECE 3364 HW 08, Fall 2016 due 11/1

Problem 1.
Nilsson, eighth edition, Problem 12.21

12.21 Find the Laplace transform of each of the following functions:

a) $f(t) = -20e^{-5(t-2)}u(t-2)$.

b) $f(t) = (8t-8)[u(t-1)-u(t-2)] + (24-8t)[u(t-2)-u(t-4)] + (8t-40)[u(t-4)-u(t-5)]$.

Problem 2.
Nilsson, eighth edition, Problem 12.40

12.40 Find $f(t)$ for each of the following functions:

a) $F(s) = \dfrac{18s^2+66s+54}{(s+1)(s+2)(s+3)}$.

b) $F(s) = \dfrac{8s^3+89s^2+311s+300}{s(s+2)(s^2+8s+15)}$.

c) $F(s) = \dfrac{11s^2+172s+700}{(s+2)(s^2+12s+100)}$.

d) $F(s) = \dfrac{56s^2+112s+5000}{s(s^2+14s+625)}$.

Problem 3.
Nilsson, eighth edition, Problem 12.42

12.42 Find $f(t)$ for each of the following functions.

a) $F(s) = \dfrac{10s^2+85s+95}{s^2+6s+5}$.

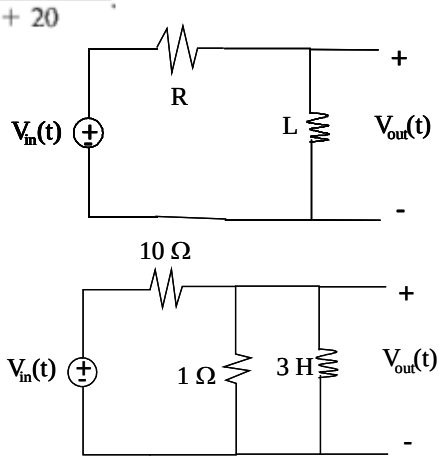
b) $F(s) = \dfrac{5(s^2+8s+5)}{s^2+4s+5}$.

c) $F(s) = \dfrac{s^2+25s+150}{s+20}$.

Problem 4. Given $v_{in}(t) = e^{-3t}u(t)$, find $v_{out}(t)$ for the two circuits below by using circuit analysis in the LaPlace transform domain.

(a) $R = 10\,\Omega$, $L = 3\,H$, and the initial current through the 3 H inductor is $i_L(0^-) = 1.0\,A$

(b) Again, the initial current through the 3 H inductor is $i_L(0^-) = 1.0\,A$



Problem 5.
Nilsson,
8th edition
Problem 13.6

13.6 A 1 kΩ resistor is in series with a 500 mH inductor. This series combination is in parallel with a 0.4 μF capacitor.

a) Express the equivalent s-domain impedance of these parallel branches as a rational function.

b) Determine the numerical values of the poles and zeros.