ECE 2260
F 08

HOMEWORK #6

THE UNIVERSITY OF UTAH

1.

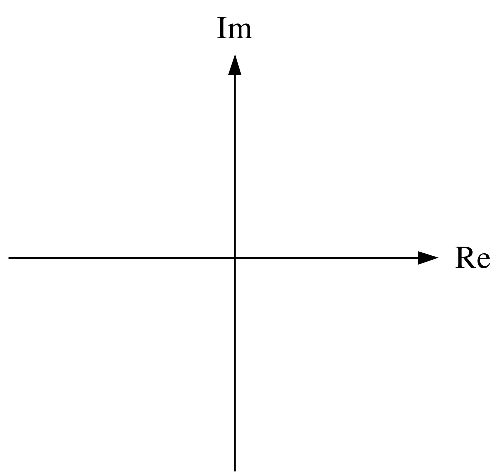
a) Find $\mathcal{L}\left\{\int_0^t e^{-6\tau}\cos(7\tau)d\tau\right\}$.

b) Find $v(t)$ if $V(s) = \dfrac{18s+148}{s^2+12s+11}$.

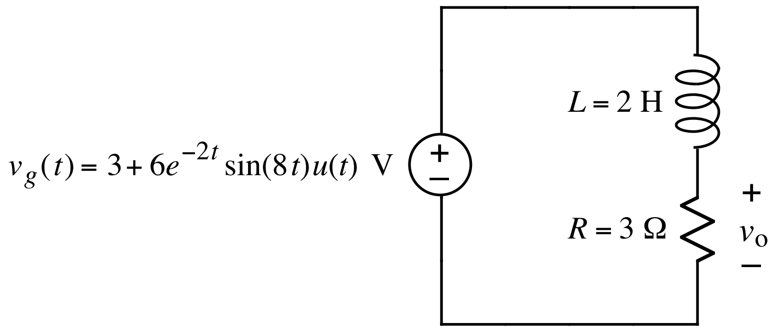
c) Find $\lim\limits_{t\to\infty} v(t)$ if $V(s) = \dfrac{s^2+4}{(s+3)^3}$.

d) Plot the poles and zeros of $V(s)$ in the s plane.

$$V(s) = \frac{s^2+5s+6}{(s+1)\left[(s+4)^2+5^2\right]}$$



2.



Note: The 3 V in the $v_g(t)$ source is always on.

After being closed for a long time, the switch opens at $t = 0$.

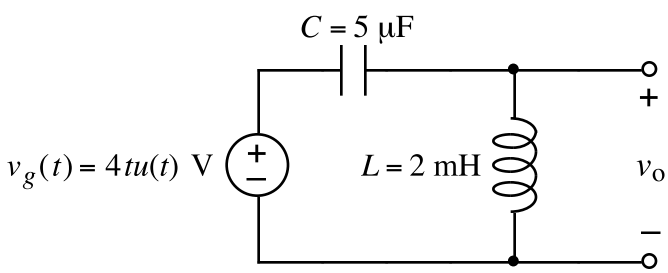
a) Write the Laplace transform, $V_g(s)$, of $v_g(t)$.

b) Draw the s-domain equivalent circuit, including source $V_g(s)$, components, initial conditions for L, and terminals for $V_o(s)$.

3. c) Write an expression for $V_o(s)$.

d) Apply the initial value theorem to find $\lim_{t \to 0+} v_o(t)$.

4.



Note: There is no energy stored in the circuit initially.

a) Write the Laplace transform, $V_g(s)$, of $v_g(t)$.

b) Write the Laplace transform $V_o(s)$ of $v_o(t)$. Be sure to include the effects of initial conditions, if they are nonzero.

c) Write a numerical time-domain expression for $v_o(t)$ where $t \geq 0$.