HOMEWORK #6

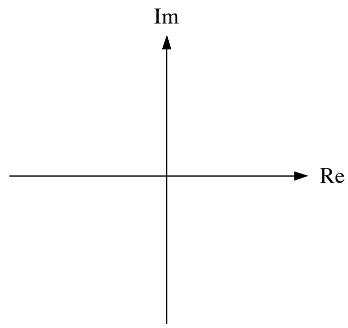
1. a) Find $\mathcal{L}\{\delta(t-4)u(t-4)+t\cos(9t)\}$.

b) Find $v(t)$ if $V(s)=\dfrac{16}{s^2+10s+25}$.

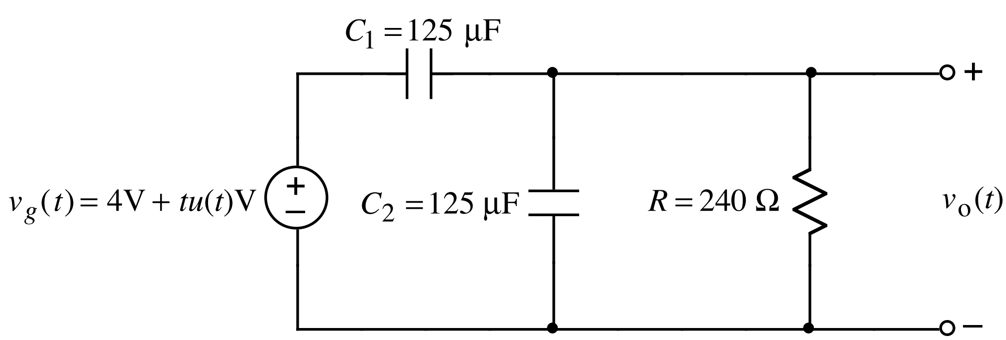
c) Find $\lim_{t\to\infty} v(t)$ if $V(s)=\dfrac{10s^2+4}{s^3+s^2+s}$.

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

$$V(s)=\frac{s^2-s-6}{s^3+6s^2+34s}$$



2.



Note: The 4 V in the $v_g(t)$ source is always on.

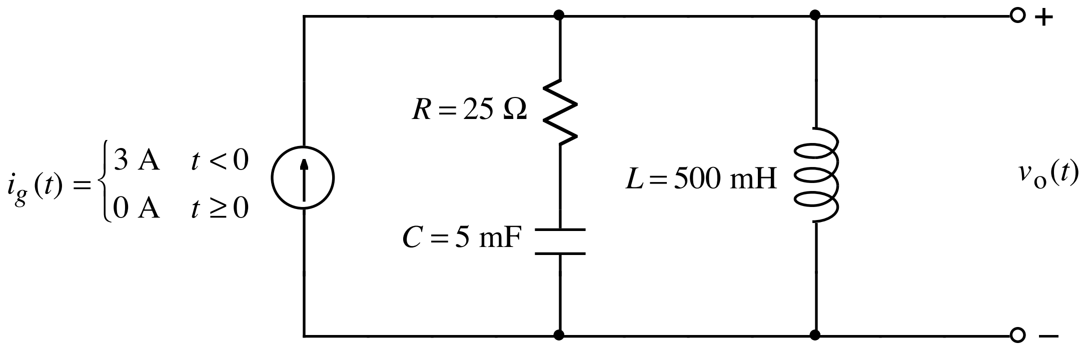
a) Write the Laplace transform, $V_g(s)$, of $v_g(t)$.

b) Draw the s-domain equivalent circuit, including source $V_g(s)$, components, initial conditions for C's, 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.



a) Write the Laplace transform $I_g(s)$ of $i_g(t)$.

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.

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