

EE422G Homework #4 (11 points)
Due February 8, 2006

1. (3 points) Final Value Theorem
- Prove the Final Value Theorem
 - For each $H(s)$ below, state if we can use the Final Value Theorem, and if so, find $x(\infty)$.

i.
$$H(s) = \frac{s+3}{(s+4)^2(s+2)}$$

ii.
$$H(s) = \frac{s+4}{(s^2+4)(s+3)}$$

2. (2 points) Obtain the inverse Laplace transform of

a.
$$X(s) = \frac{7s^2 + 15s + 10}{(s+1)^2(s+3)}$$

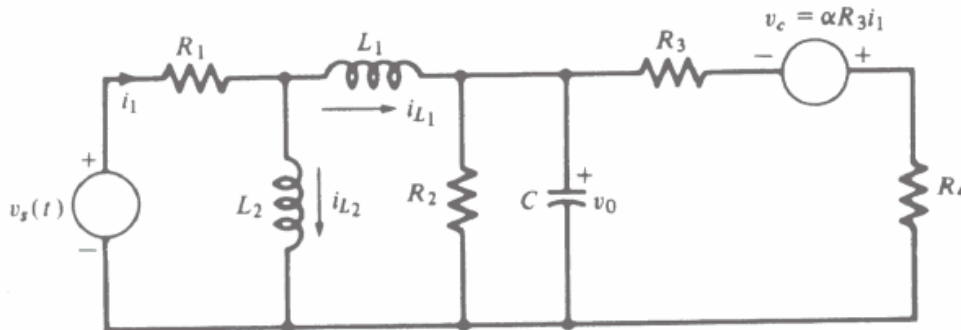
b.
$$X(s) = \frac{s^4 + 8s^2 + s + 17}{(s^2 + 4)^2(s+1)}$$

3. (2 points) Find the inverse Laplace transforms of the following functions of s

a.
$$X(s) = \frac{2s^4 - 3s^3 + 36s^2 - 26s + 162}{s(s^2 + 9)^2}$$

b.
$$X(s) = \frac{1}{(s+3)(1+e^{-2s})}$$

4. (2 points) Sketch the Laplace-transformed equivalent, including initial-condition generators, of the circuit below. Choose initial-condition generators appropriate for writing loop equations.



5. (2 points) Use Laplace transform to find $v_0(t)$ for the circuit shown. All initial conditions are zero.

