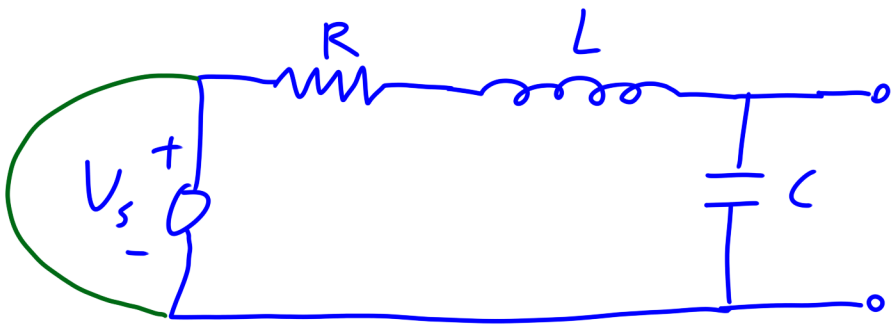
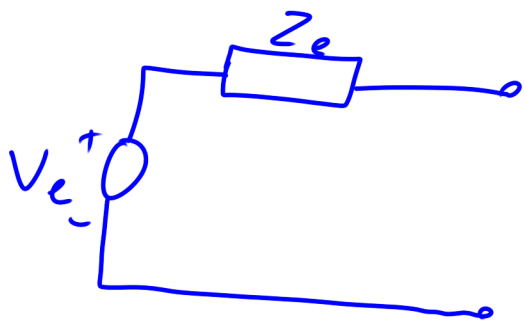
RW 13.12



a) Generate a Thevinin equivalent circuit



$$Z_e = \frac{1}{\frac{1}{Z_{RL}} + \frac{1}{Z_C}} \qquad Z_{RL} = Z_R + Z_L$$

$$= \frac{1}{\frac{1}{Z_R + Z_L} + \frac{1}{Z_C}} = \frac{1}{\frac{1}{R + Ls} + Cs} \quad \frac{R + Ls}{R + Ls}$$

$$= \frac{R + Ls}{1 + RCs + LCs^2}$$

$$V_e = \frac{Z_C}{Z_R + Z_L + Z_C} V_s = \frac{1/Cs}{R + Ls + 1/Cs} V_s$$

$$= \frac{1}{RCs + LCs^2 + 1} V_s$$

b) Generate a Norton equivalent

$$I_e (Z_R + Z_L) = V_s$$

$$I_e = \frac{V_s}{Z_R + Z_L} = V_s \quad \frac{1}{R + Ls}$$

$$V_e = Z_e I_e$$

$$V_s \frac{1}{RCs + LCs^2 + 1} = \frac{\cancel{R + Ls}}{1 + RCs + LCs^2} V_s \quad \frac{1}{\cancel{R + Ls}}$$