VE215 2023Su Assignment 8
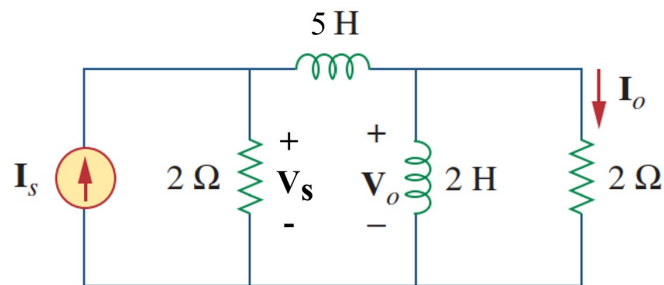
Due Date: 23:59, August 3rd, 2023

In order to get full marks, you shall write all the intermediate steps of calculation or proof unless otherwise indicated.

Exercise 8.1 (30%)
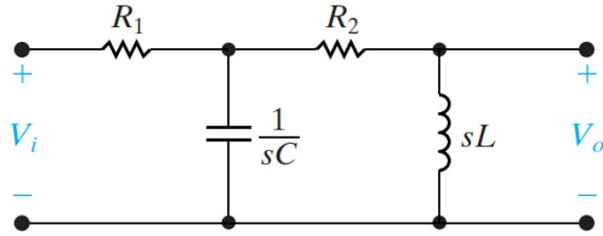
For the circuit shown below, find the transfer function

(a) (15%) $I_o(\omega)/I_s(\omega)$, and its zeros and poles.

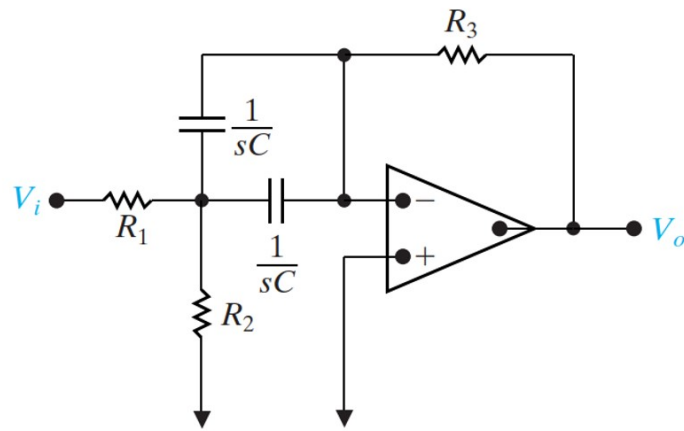(b) (15%) $V_s(\omega)/I_s(\omega)$, and its zeros and poles.

Exercise 8.2 (30%)

Find $H(s) = V_o(s)/V_i(s)$, where $s = j\omega$ in both circuits. Assume that $R_1 = R_2 = R_3 = 100\Omega$, $L = 1\text{H}$ and $C = 1\text{mF}$ for (a) and (b).

(a)

(b)

Exercise 8.3 (40%)

Obtain the Bode plots ($H - \omega$ and $\phi - \omega$ relationship) for

(a) (20%)

$$H(j\omega) = \frac{0.1(20 + j\omega)}{j\omega(5 + j\omega)}$$

(b) (20%)

$$H(j\omega) = \frac{100(1 + j\omega)}{j\omega(-\omega^2 + 10j\omega + 25)}$$