23S-EC ENGR-3-LEC-1 Homework 5

SANJIT SARDA

TOTAL POINTS

100 / 100

QUESTION 1

1 Q1 100 / 100

✓ **- 0 pts** *Correct*

- 10 pts Partially Incorrect (Thevenin Voltage / Norton Current)

- 25 pts Mostly Incorrect (Thevenin Voltage / Norton Current)

- 50 pts Incorrect (Thevenin Voltage / Norton Current)

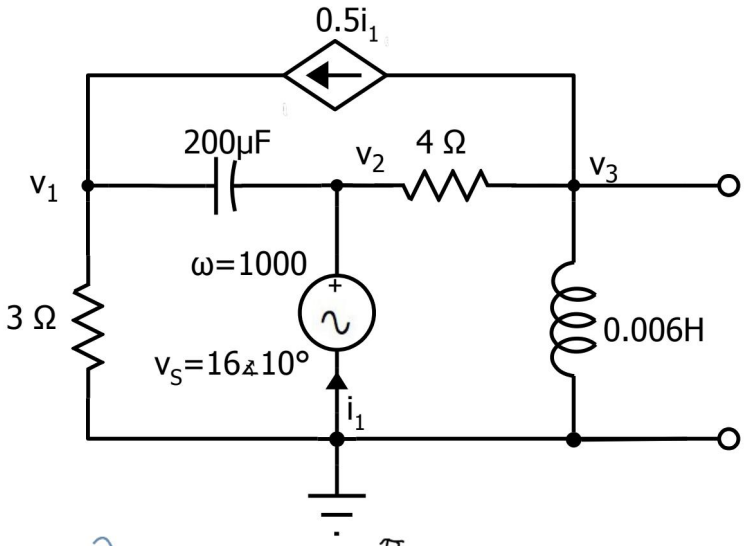
- 10 pts Partially Incorrect (Thevenin Resistance)

- 25 pts Mostly Incorrect (Thevenin Resistance)

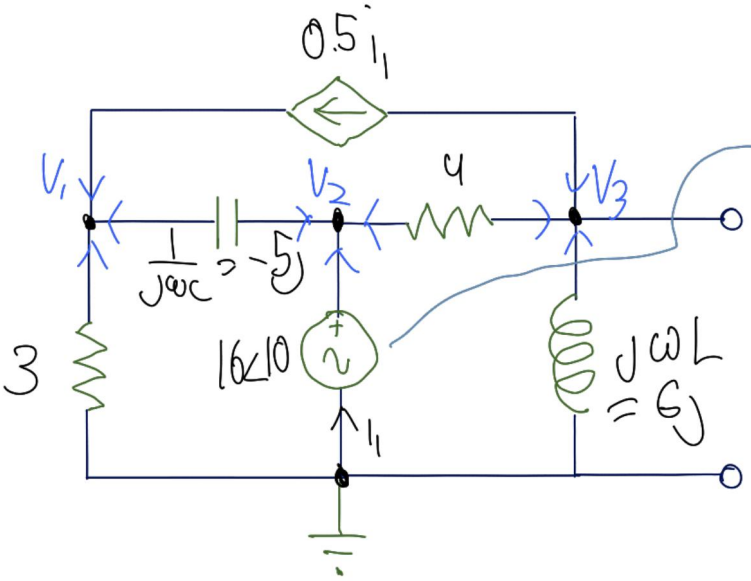
- 50 pts Incorrect (Thevenin Resistance)

EE3 Spring 2023
Homework Problem 5

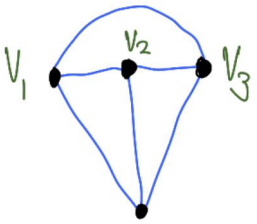
Find the Thévenin Equivalent of this circuit.



Open Circuit Analysis:



$V_2 = 16\,e^{j\frac{\pi}{18}}$, $\omega = 1000$



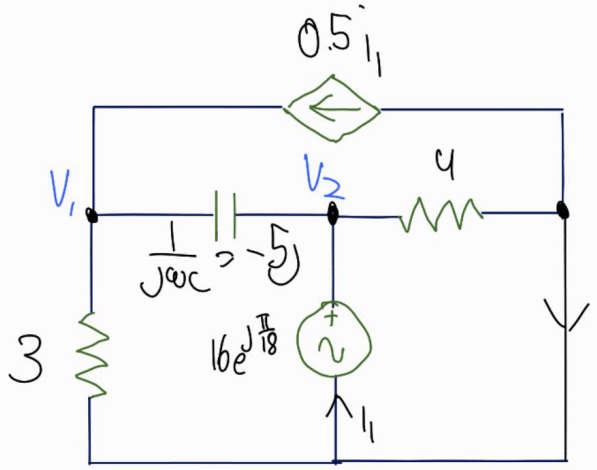
@V_1: $\frac{V_1 - V_2}{5j} + \frac{-V_1}{3} + 0.5i_1 = 0$

@V_2: $i_1 + \frac{V_2 - V_1}{5j} + \frac{V_3 - V_2}{4} = 0$

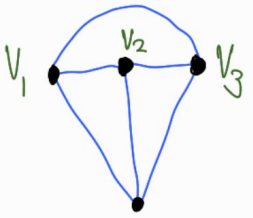
@V_3: $-0.5i_1 + \frac{V_2 - V_3}{4} + \frac{-V_3}{6j} = 0$

Solving for V_3,

$V_{Th} = 7.82\,e^{0.616j}\ V$



$V_2 = 16\,e^{j\frac{\pi}{18}}, \omega = 1000$



@ V_1: $\frac{V_1 - 16e^{j\frac{\pi}{18}}}{5j} + \frac{-V_1}{3} + 0.5i_1 = 0$

@ V_2: $i_1 + \frac{16e^{j\frac{\pi}{18}} - V_1}{5j} + \frac{-16e^{j\frac{\pi}{18}}}{4} = 0$

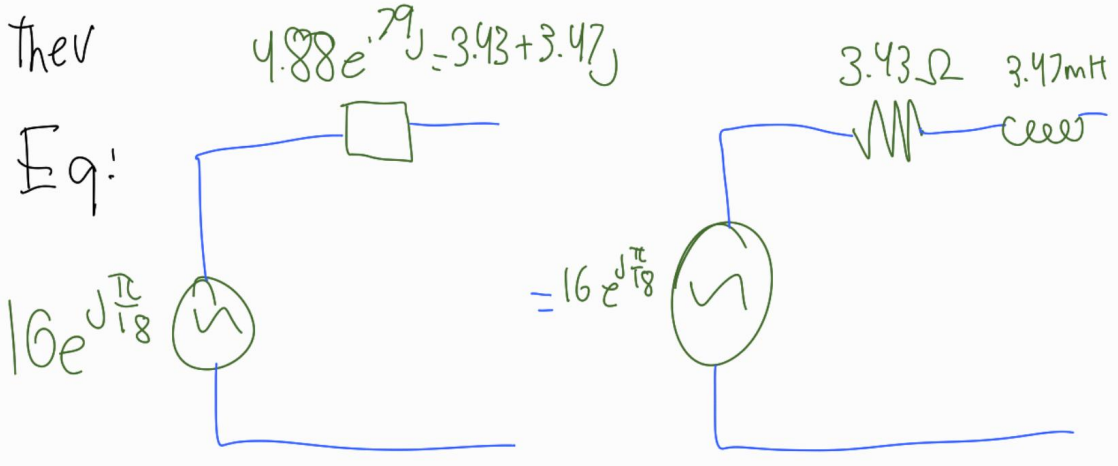
@ V_3: $I_n = 4e^{j\frac{\pi}{18}} - \frac{i_1}{2}$

Solving for I_n,

$I_n = 1.6e^{-0.1j}$

$$Z_{th} = \frac{V_{Th}}{I_n} = \frac{7.82\,e^{0.616j}}{1.6e^{-0.1j}} = 4.88\,e^{0.7j}$$

Thev Eq:



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