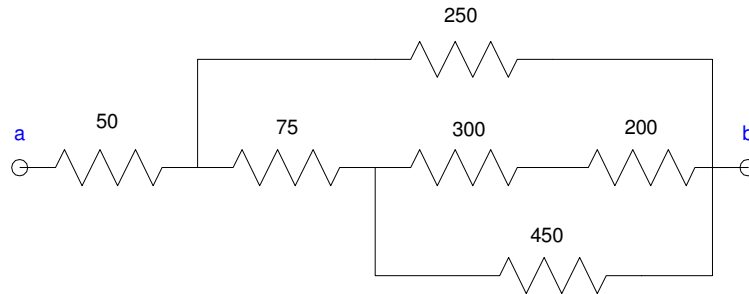


# ECE 476 - Homework #1

*Python Programming - Due Wednesday, September 4th*

1) Use Thonny as a calculator (similar to the Matlab command window) to determine the resistance  $R_{ab}$



Recall:

- Resistors in series add as  $R_1 + R_2$
- Resistors in parallel as  $1 / (1/R_1 + 1/R_2)$

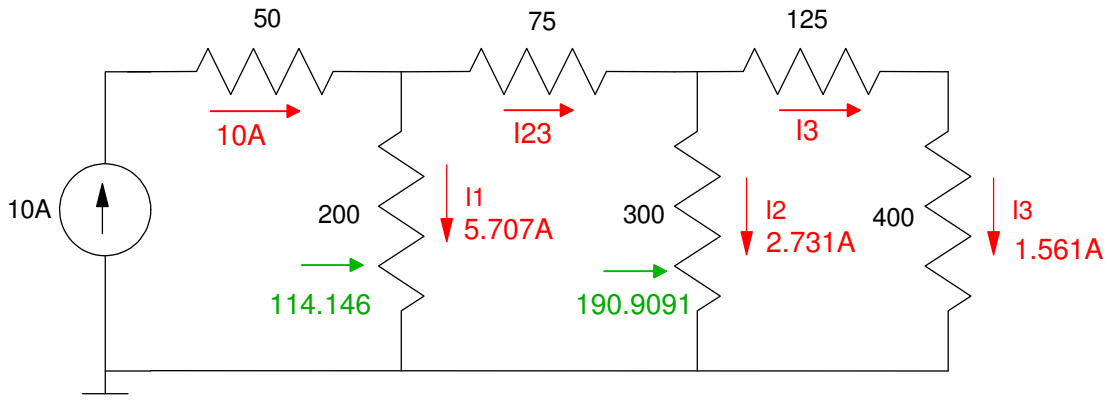
In Python:

```
Traceback (most recent call last):
  File "main.py", line 177, in <module>
    File "LCD.py", line 464, in Text2
KeyboardInterrupt:
MicroPython v1.22.2 on 2024-02-22; Raspberry Pi Pico W with RP2040
Type "help()" for more information.
MicroPython v1.22.2 on 2024-02-22; Raspberry Pi Pico W with RP2040
Type "help()" for more information.
```

```
>>> R1 = 200 + 300
>>> R2 = 1 / (1/R1 + 1/450)
>>> R3 = R2 + 75
>>> R4 = 1 / (1/R3 + 1/250)
>>> Rab = 50 + R4
>>> Rab
```

**188.7588**

2) Use Thonny as a calculator to determine the current  $I_x$  using current division

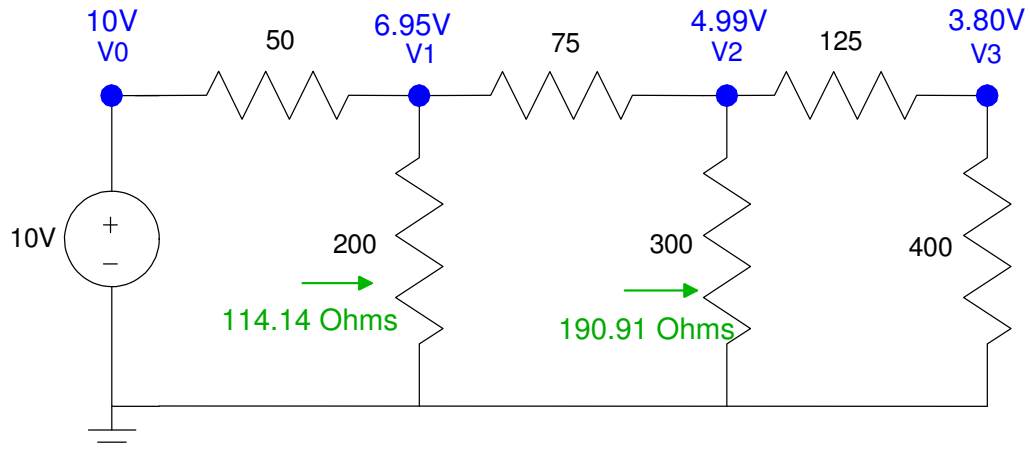


Recall that current division is

$$I_1 = \left( \frac{\frac{1}{R_1}}{\frac{1}{R_1} + \frac{1}{R_2}} \right) I_0$$

```
>>> #----- Problem #2 -----
>>> R3 = 400
>>> R2 = 1 / (1/300 + 1/525)
>>> R2
190.9091
>>> R1 = 1 / (1/200 + 1/(R2 + 75))
>>> R1
114.1463
>>> I1 = (1/200) / ( 1/200 + 1/(75+R2)) * 10
>>> I1
5.707317
>>> I23 = 10 - I1
>>> I2 = (1/300) / (1/300 + 1/(400+125)) * I23
>>> I2
2.731707
>>> I3 = I23 - I2
>>> I3
1.560976
```

3) Use Thonny as a calculator to determine the voltages {V1, V2, V3}

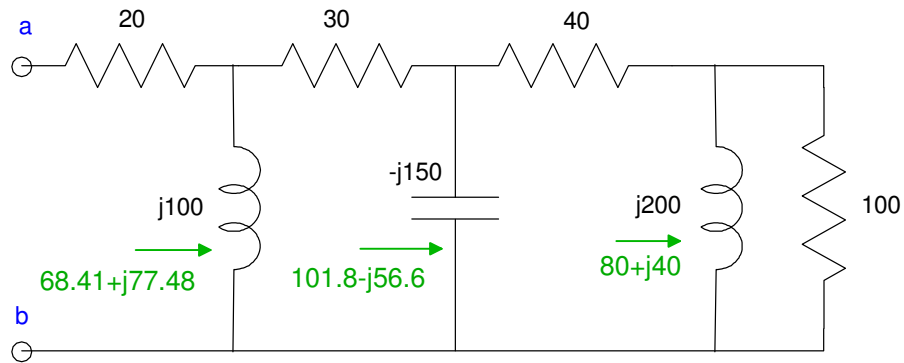


Recall voltage division

$$V_3 = \left( \frac{400}{400+125} \right) V_2$$

```
>>> # ----- Problem #3 -----
>>> R3 = 400;
>>> R2 = 1 / (1/300 + 1/525)
>>> R2
190.9091
>>> R1 = 1 / (1/200 + 1/(75 + R2))
>>> R1
114.1463
>>> V1 = R1 / (R1 + 50) * 10
>>> V1
6.953938
>>> V2 = R2 / (R2 + 75) * V1
>>> V2
4.992571
>>> V3 = 400 / (400 + 125) * V2
>>> V3
3.803864
```

4) Use Thonny as a calculator to determine the impedance  $Z_{ab}$



```

>>> # ----- Problem #4 -----
>>> j = (-1) ** 0.5
>>> R3 = 1 / (1/(j*200) + 1/100)
>>> R3
(80+40j)
>>> R1 = 1 / (1/(j*200) + 1/100)
>>> R1
(80+40j)
>>> R2 = R1 + 40
>>> R2
(120+40j)
>>> R3 = 1 / (1/(-j*150) + 1/R2)
>>> R3
(101.8868-56.60377j)
>>> R4 = R3 + 30
>>> R4
(131.8868-56.60377j)
>>> R5 = 1 / ( 1/(j*100) + 1/R4 )
>>> R5
(68.41539+77.48849j)
>>> Rab = R5 + 20
>>> Rab
(88.41539+77.48849j)
>>>

```