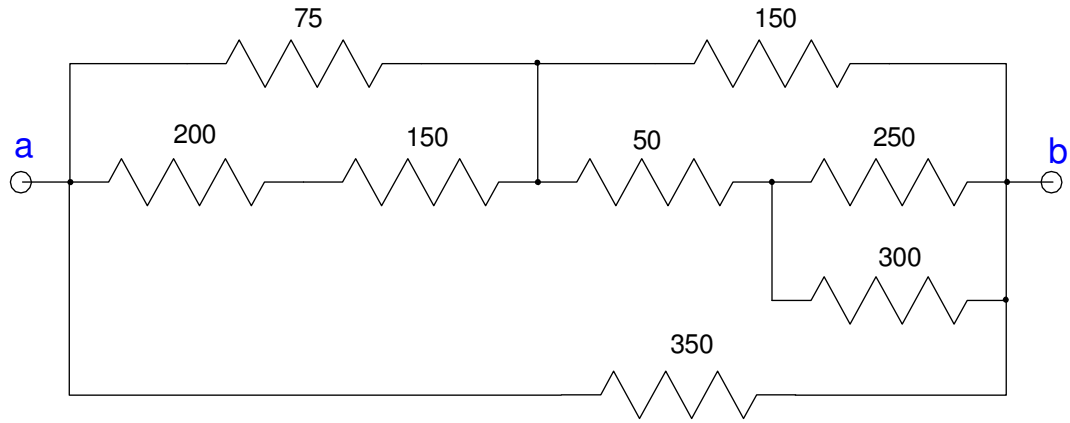


ECE 476 - Homework #1

Python Programming

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

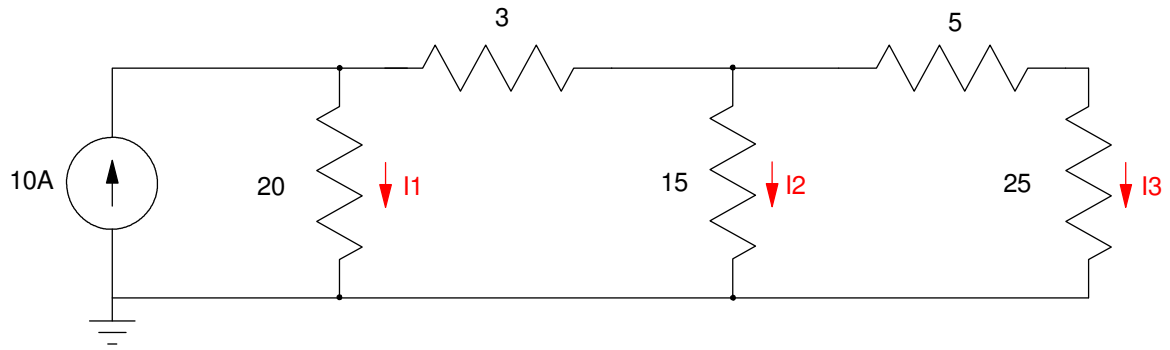


In Python using the command window (script window)

- The total resistance is 102.4615 Ohms

```
MPY: soft reboot
MicroPython v1.26.0 on 2025-08-09; Raspberry Pi Pico W with RP2040
Type "help()" for more information.
>>> R1 = 1 / (1/250 + 1/300)
>>> R1
136.36363
>>> R2 = R1 + 50
>>> R2
186.363632
>>> R3 = 1 / ( 1/R2 + 1/150 )
>>> R3
83.10811
>>> R4 = 200 + 150
>>> R4
350
>>> R5 = 1 / ( 1/R4 + 1/75 )
>>> R5
61.764704
>>> R6 = R5 + R3
>>> R6
144.87282
>>> R7 = 1 / ( 1/R6 + 1/350 )
>>> R7
102.46165
>>>
```

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

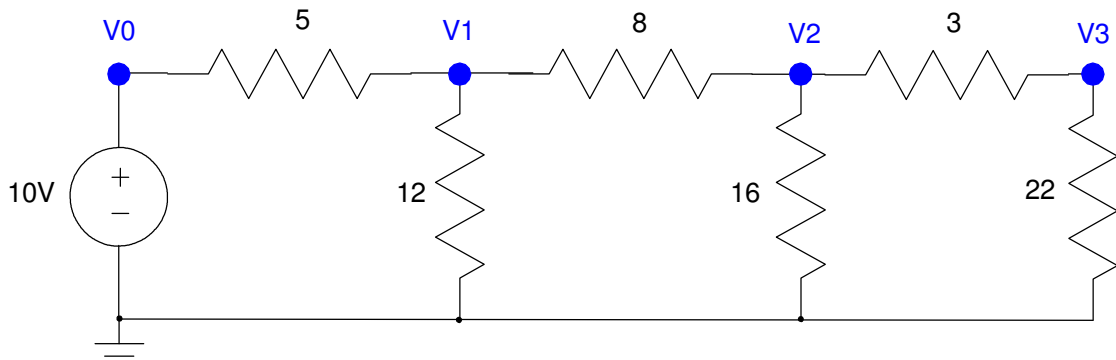


The currents are

- $I_1 = 3.939394 \text{ A}$
- $I_2 = 4.040404 \text{ A}$
- $I_3 = 2.020202 \text{ A}$

```
MPY: soft reboot
MicroPython v1.26.0 on 2025-08-09; Raspberry Pi Pico W with RP2040
Type "help()" for more information.
>>> R3 = 5 + 25
>>> R3
30
>>> R2 = 1 / ( 1/15 + 1/R3 )
>>> R2
9.999999
>>> I1 = (1/20) / ( (1/20) + (1/(3+R2)) ) * 10
>>> I1
3.939394
>>> I2 = (1/15) / ( (1/15) + (1/30) ) * ( 10 - I1 )
>>> I2
4.040404
>>> I3 = (1/30) / ( (1/15) + (1/30) ) * ( 10 - I1 )
>>> I3
2.020202
>>> I1 + I2 + I3
9.999999
>>>
```

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

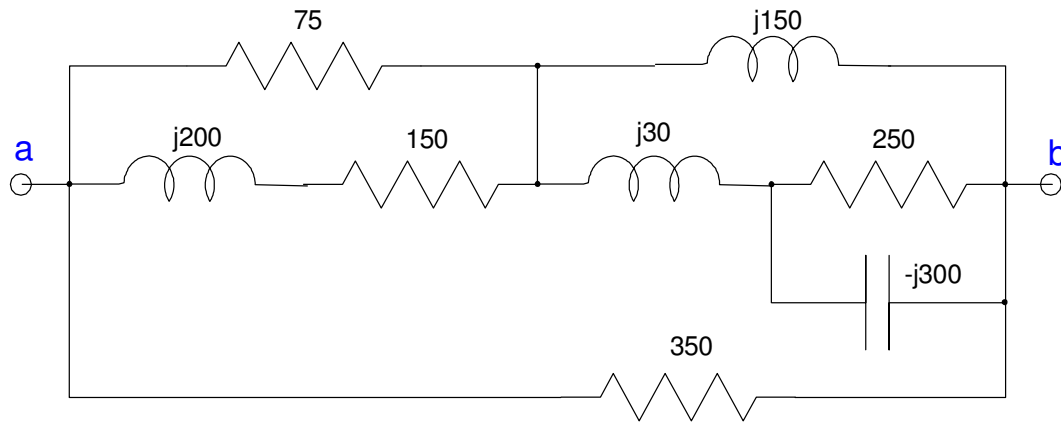


The voltages are

- V1 = 5.88838 V
- V2 = 3.2353738 V
- V3 = 2.8471288 V

```
MPY: soft reboot
MicroPython v1.26.0 on 2025-08-09; Raspberry Pi Pico W with RP2040
Type "help()" for more information.
>>> R3 = 22
>>> R3
22
>>> R2 = 1 / ( 1/16 + 1/(3+22) )
>>> R2
9.756098
>>> R1 = 1 / ( 1/12 + 1/(8 + R2) )
>>> R1
7.160656
>>> V1 = R1 / (R1 + 5) * 10
>>> V1
5.88838
>>> V2 = R2 / (R2 + 8) * V1
>>> V2
3.2353738
>>> V3 = R3 / (R3 + 3) * V2
>>> V3
2.8471288
>>>
```

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



The total impedance is

- $(133.72505 + 44.200412j)$

```
MPY: soft reboot
MicroPython v1.26.0 on 2025-08-09; Raspberry Pi Pico W with RP2040
Type "help()" for more information.
>>> Z1 = 1 / ( 1/250 + 1/(-300j) )
>>> Z1
(147.54098-122.95081j)
>>> Z2 = Z1 + 30j
>>> Z2
(147.54098-92.95081j)
>>> Z3 = 1 / ( 1/Z2 + 1/(150j) )
>>> Z3
(132.66508+98.702832j)
>>> Z4 = 1 / ( 1/(150+200j) + 1/75 )
>>> Z4
(61.03448+12.413793j)
>>> Z5 = Z3 + Z4
>>> Z5
(193.699568+111.11663j)
>>> Z6 = 1 / ( 1/Z5 + 1/350 )
>>> Z6
(133.72505+44.200412j)
>>>
```