ECE 321: Handout #16
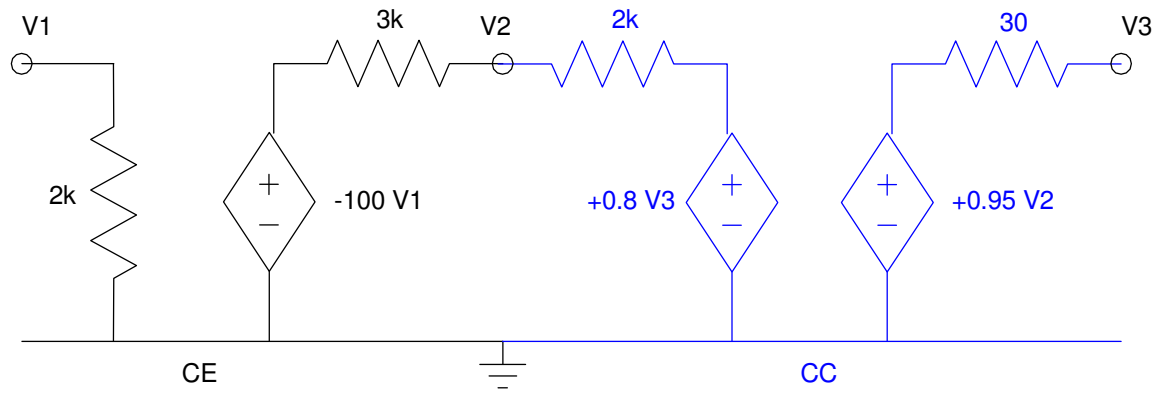
Multi-Stage Amplifiers
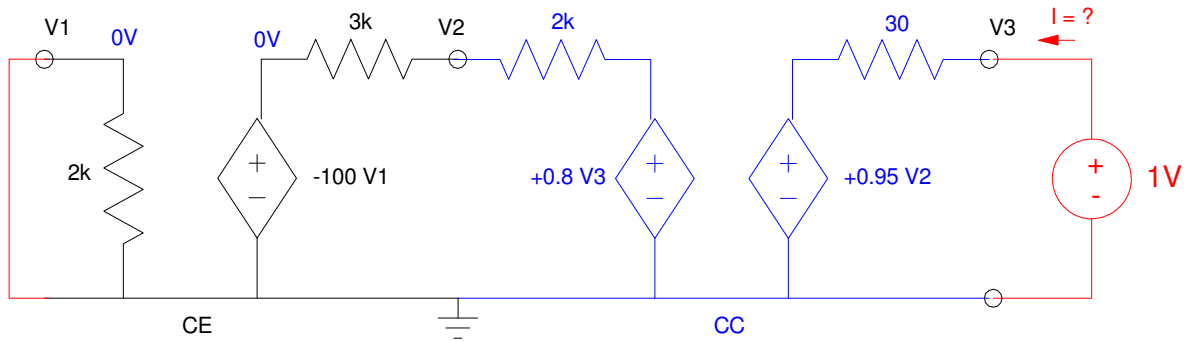
Determine the 2-port model for a CE : CC amplifier

Solution:

By inspection
- Rin = 2k
- Ai = 0

Rout:
- Tie V1 to ground
- Connect 1V to V3
- Compute the current

By voltage division, V2 is...

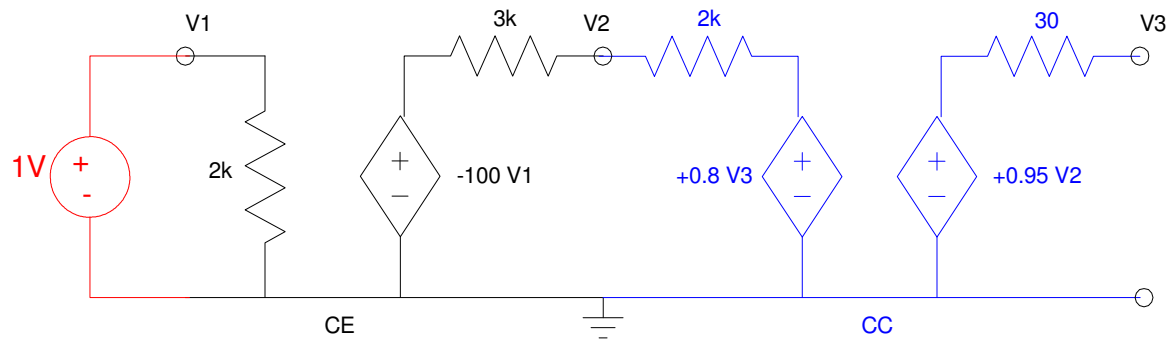$$V_2 = \left(\frac{3k}{3k+2k}\right) \cdot 0.8V$$

$$V_2 = 0.48V$$

I is then

$$I = \left(\frac{1V - 0.48V}{30}\right) = 17.33mA$$

$$R_{out} = \frac{1V}{17.33mA} = 57.69\Omega$$

Ao:

- Connect Vin to +1V
- Compute Vout

Writing the votlage node equation at V2

$$\left(\frac{V_2-(-100)}{3k}\right) + \left(\frac{V_2-0.8V_3}{2k}\right) = 0$$

$$V_3 = 0.95V_2$$

Substituting

$$\left(\frac{V_2+100}{3}\right) + \left(\frac{V_2-0.8 \cdot 0.95V_2}{2}\right) = 0$$

$$V_2 = -73.53V$$

Then

$$V_3 = 0.95V_2 = -69.85$$

The resulting 2-port model is then