

# ECE 321 - Quiz #1 - Name \_\_\_\_\_

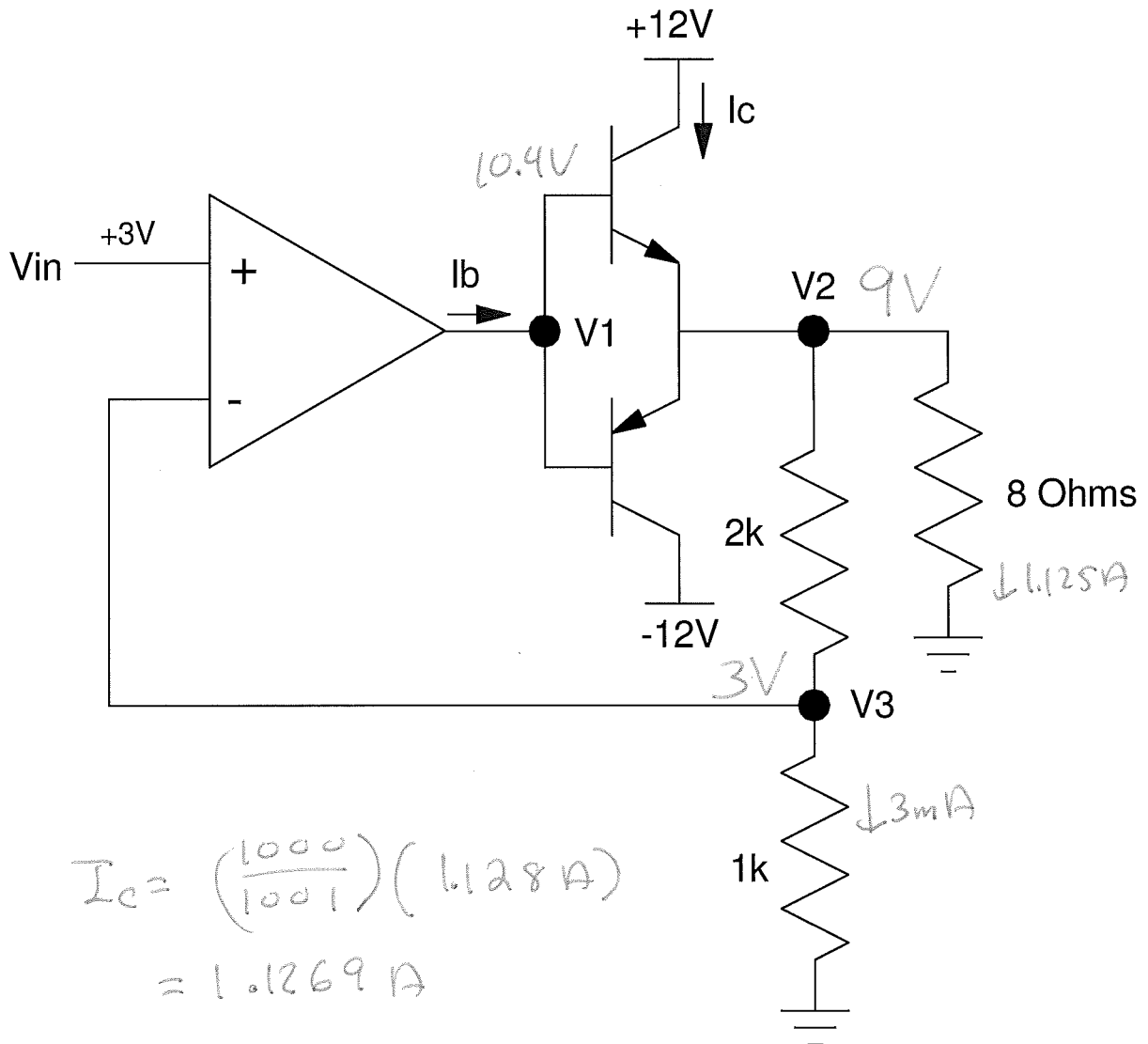
Push-Pull Amplifiers, Op-Amp Amplifiers, Temperature Sensors. Fall 2019

1) Push-Pull: Determine the voltages and currents for the following push-pull amplifier. Assume TIP transistors

- $|V_{be}| = 1.4V$
- $\beta = 1000$

V1	V2	V3	Ib	Ic
10.4V	9.0V	3.0V	6.1269mA	6.1269A

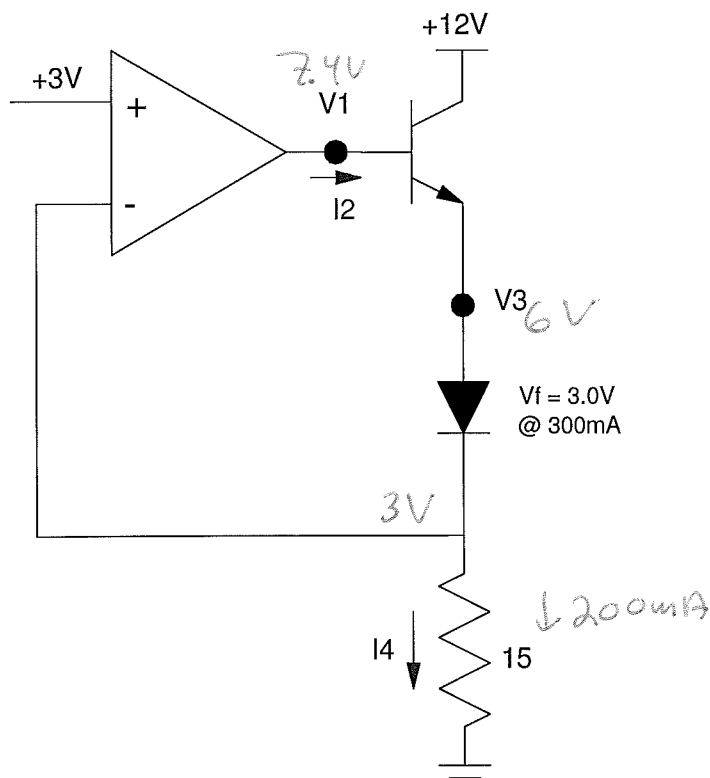
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2) Push-Pull: Determine the voltages and currents for the following amplifier. Assume TIP transistors

- $V_{be1} = 1.4V$
- $\beta = 1000$

V1	I2	V3	I4
7.4V	200 $\mu$ A	6.0V	200mA



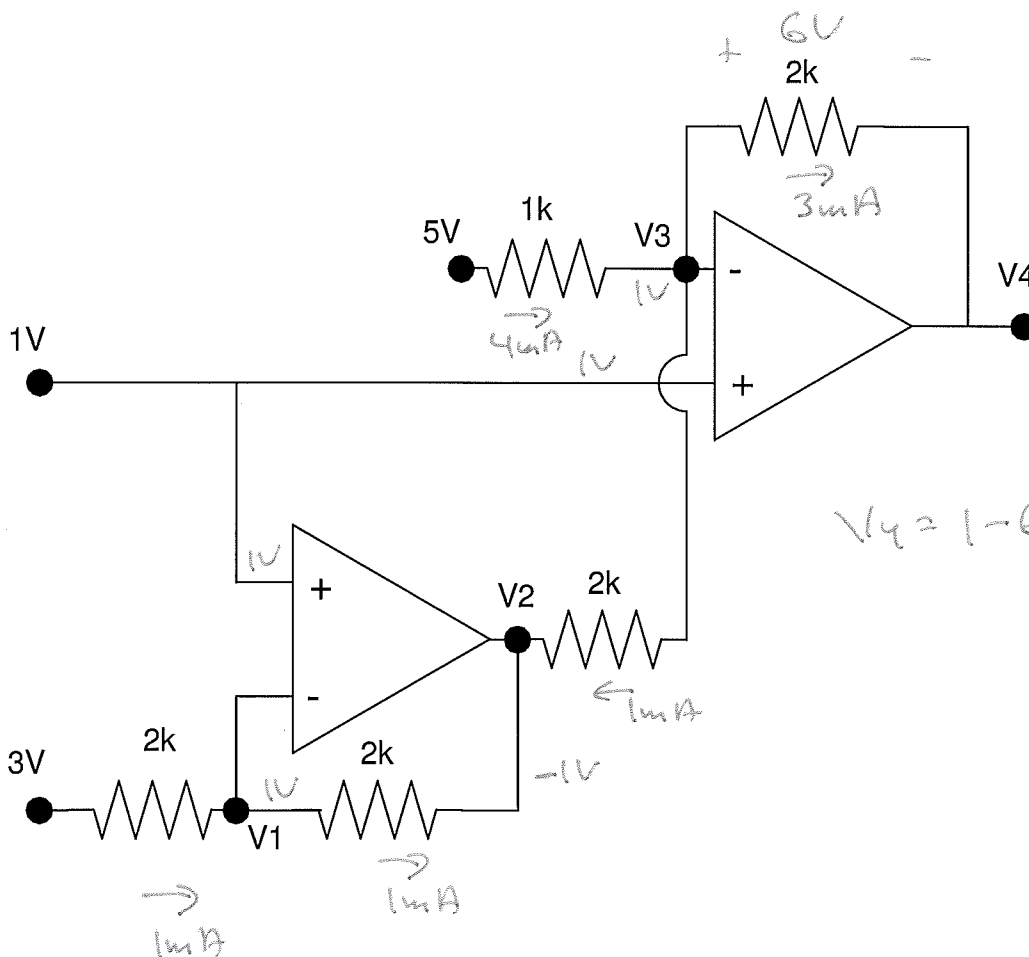
$$I_2 = \left(\frac{1}{1001}\right) (200\mu A)$$

$$= 199.8\mu A$$

$$\approx 200\mu A$$

3) Determine the voltages for the following op-amp circuit. Assume ideal op-amps

V1	V2	V3	V4
1V	-1V	1V	-5V



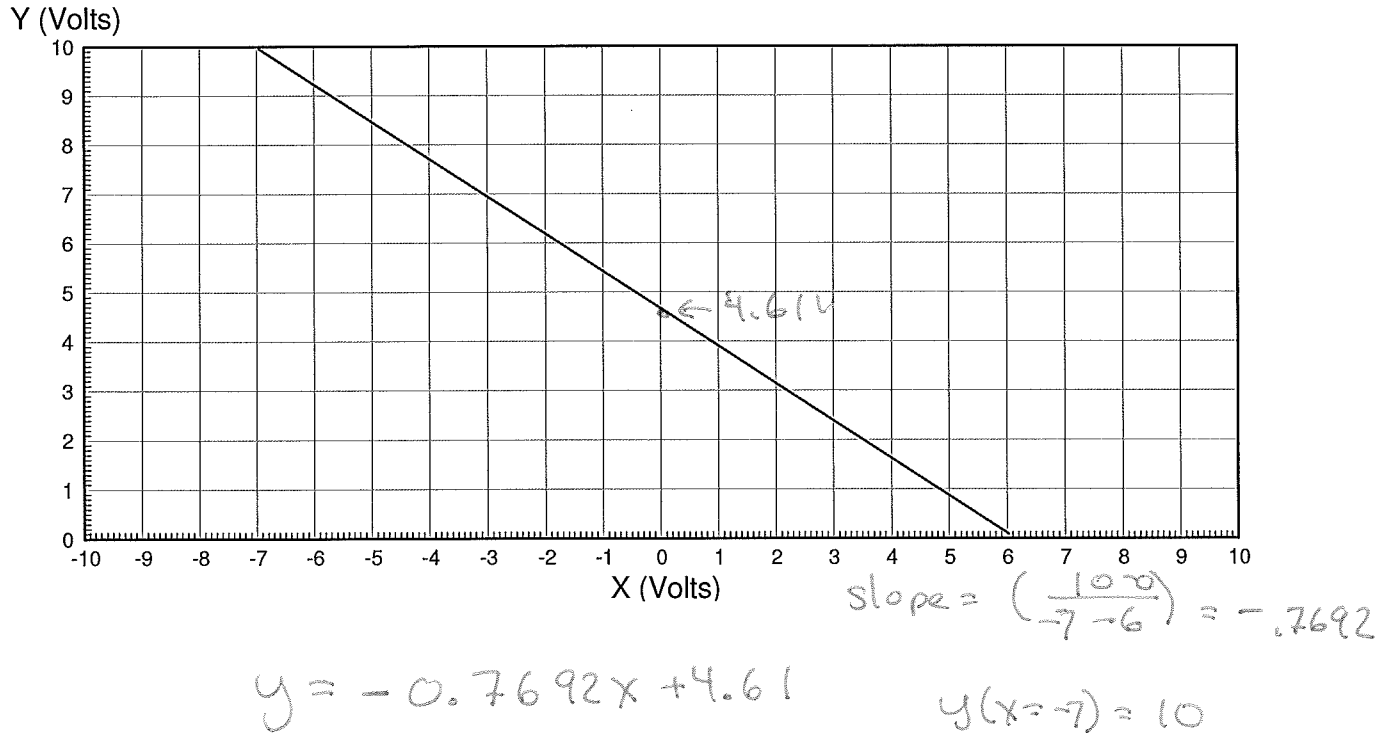
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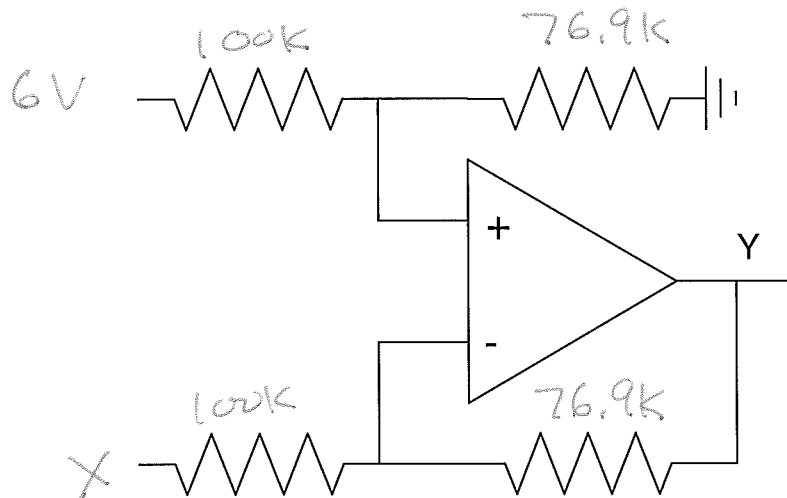
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4a) Determine the relationship between X and Y



4b) Design an amplifier to implement this function

$$y = -0.7692(x - 6) = 0.7692(6 - x)$$

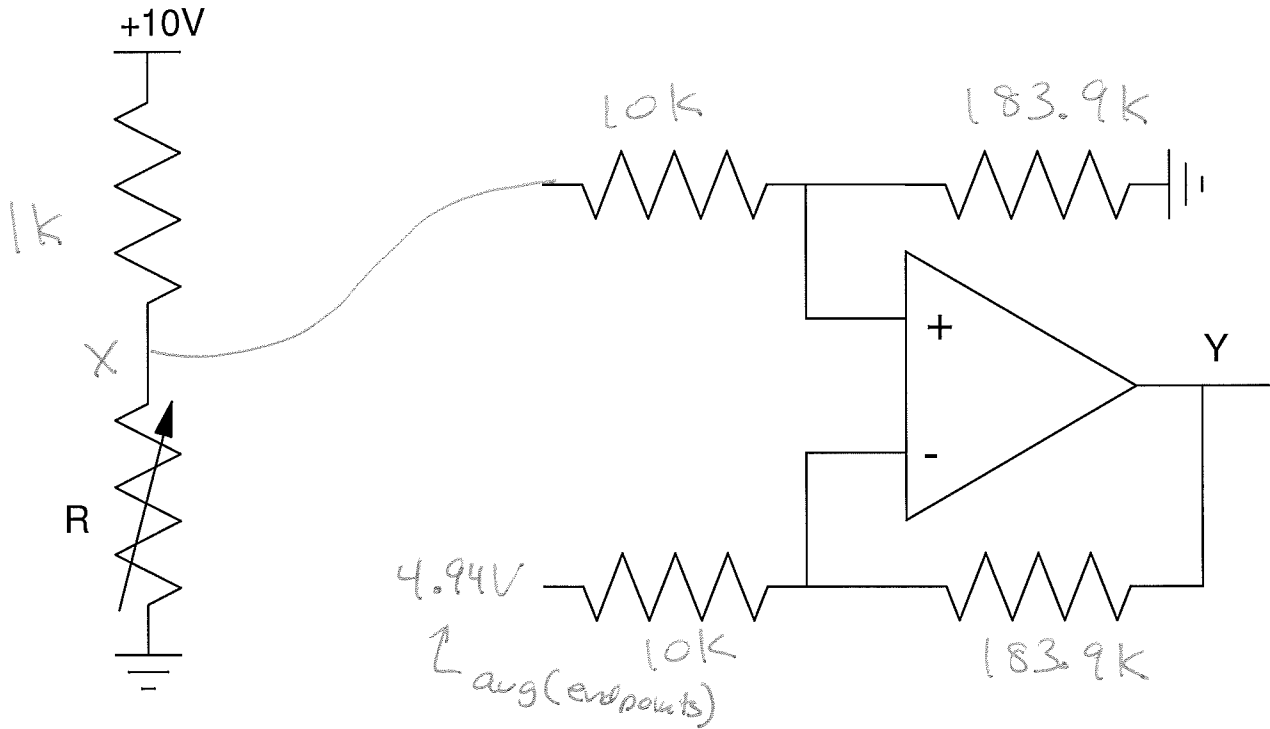


5) An RTD has the following temperature - resistance relationship

$$R = 1000 \cdot (1 + 0.0043T) \Omega$$

where T is the temperature in degrees C. Design a circuit which outputs

- -10V at -50C and
- +10V at +50C



-50°

$$R = 785$$

$$X = 4.3978V$$

$$y = -10$$

+50°

$$R = 1215$$

$$X = 5.4943V$$

$$y = +10$$

$$\text{slope} = \frac{10 - (-10)}{5.4943 - 4.3978} = 18.39$$

Phinneas and Ferb Bonus! What was the purpose of the Copy-and-Paste-Inator?

- Automate the writing of English papers when Dr. Doofenschmirtz was in college
- Make a copy of Dr. Doofenschmirtz so he wouldn't have to wait in lines any more.
- Speed up the process of getting a drivers license
- Humiliate Dr. Doofenschmirtz's older brother by posting his award speech all over the city