

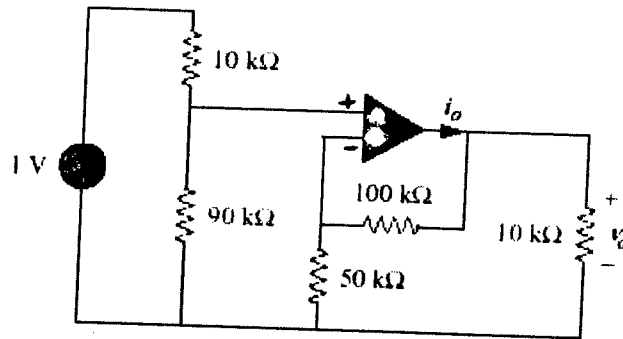
Solution Quiz 1

ELE302 Quiz1-a

Name:

Student No:

Q: Find v_o and i_o in the circuit of Figure



$$V_+ = (1) \times \frac{90}{100} = 0.9V = V_o \left[\frac{50}{150} \right] = \frac{V_o}{3}$$

$$\therefore \boxed{V_o = 2.7V}$$

$$i_o = \frac{V_o}{150k} + \frac{V_o}{10k} = 2.7 \left[0.007 + 0.1 \right] \times 10^{-3} A$$

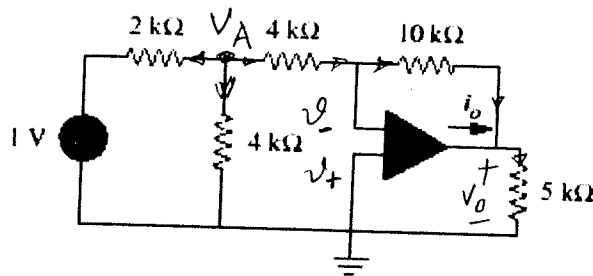
$$\boxed{i_o = 0.288 \text{ mA}}$$

ELE302 QUIZ1-b

Name:

Student No:

Q: Determine i_o in the circuit of Figure.



$$v_+ = v_- = 0$$

$$\frac{V_A - 1}{2k} + \frac{V_A}{4k} + \frac{V_A}{4k} = 0$$

$$2V_A - 2 + 2V_A = 0 \Rightarrow 4V_A = 2 \therefore V_A = \frac{1}{2} = 0.5V$$

$$\frac{V_A - 0}{4k} = \frac{0 - V_o}{10k} \quad \therefore V_o = -\frac{10}{4} V_A = -2.5 V_A = -2.5(0.5)$$

$$\therefore V_o = -1.25V$$

$$i_o + \frac{0 - V_o}{10k} = \frac{V_o}{5k}$$

$$i_o = \frac{V_o}{5k} + \frac{V_o}{10k} = (-1.25) \left[\frac{0.2}{0.3} + 0.1 \right] \times 10^{-3}$$

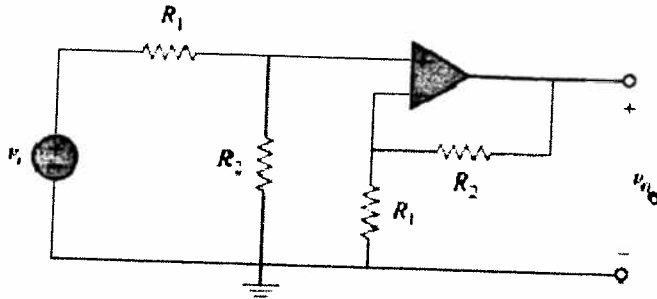
$$i_o = -0.375 \text{ mA}$$

ELE302 QUIZ1-c

Name:

Student No:

Q: Determine the voltage gain v_o/v_i of the op amp circuit in Figure.



$$v_- = v_o \frac{R_1}{(R_1 + R_2)}$$

$$\& \quad v_+ = v_i \frac{R_2}{(R_1 + R_2)}$$

$$\therefore v_- = v_+$$

$$v_o \frac{R_1}{(R_1 + R_2)} = v_i \frac{R_2}{(R_1 + R_2)}$$

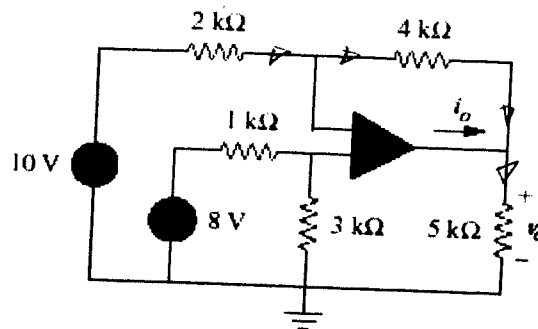
$$\boxed{\frac{v_o}{v_i} = \frac{R_2}{R_1}}$$

ELE302 Quiz1-d

Name:

Student No:

Q: Find v_o and i_o in the differential amplifier of Figure.



$$v_+ = 8 \left[\frac{3}{4} \right] = 6V = v_-$$

&

$$\frac{10 - v_-}{2k} = \frac{v_- - v_o}{4k}$$

$$20 - 2v_- = v_- - v_o$$

$$\therefore v_o = 3v_- - 20 = 3(6) - 20 = 18 - 20 = \boxed{-2V}$$

&

$$i_o + \frac{v_- - v_o}{4k} = \frac{v_o}{5k}$$

$$i_o = \frac{v_o}{5k} + \frac{v_o}{4k} - \frac{v_-}{4k}$$

$$= \left(\frac{-2}{5} + \frac{-2}{4} - \frac{6}{4} \right) 10^{-3}$$

$$= (-0.4 - 0.5 - 1.5) 10^{-3}$$

$$\boxed{i_o = -2.4 \text{ mA}}$$