Solution of ECE 300 Test 4 S11

1. With reference to the circuit below fill in the blanks with numbers.

(a) With the voltage source V_s acting alone find these voltages and currents.

$$V_1 = V_s \frac{R_1}{R_1+R_2} = 11\frac{200}{200+550} = 2.933 \text{ V} \quad V_2 = V_s \frac{R_2}{R_1+R_2} = 11\frac{550}{200+550} = 8.0667 \text{ V} \quad V_{I_s} = -V_2 = -8.0667 \text{ V}$$

$$V_f = I_f R_f = 0 \times 900\Omega = 0 \text{ V} \quad V_L = -\left(V_{I_s} + V_f\right) = 8.0667\text{V} \quad I_{V_s} = \frac{V_s}{R_1+R_2} = \frac{11\text{V}}{750\Omega} = 14.7\text{mA}$$

$$I_2 = I_{V_s} = 14.7 \text{ mA} \quad I_f = 0\text{A} \quad I_L = \frac{V_L}{R_L} = \frac{8.0667\text{V}}{50\Omega} = 161.3 \text{ mA}$$

(b) With the current source I_s acting alone find these voltages and currents.

$$V_1 = 0 \text{ V} \quad V_2 = 0 \text{ V} \quad V_{I_s} = -V_2 = 0 \text{ V}$$

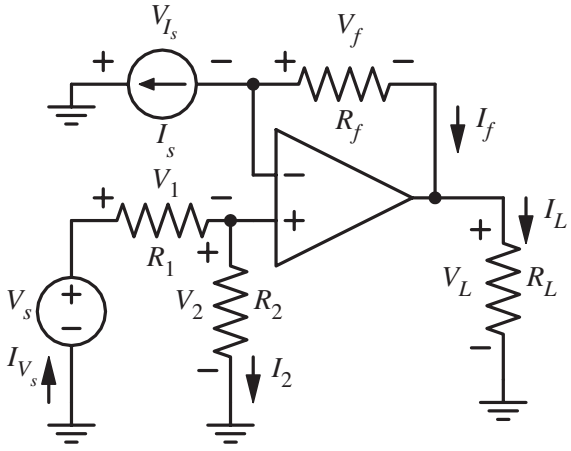
$$V_f = I_f R_f = -4\text{mA} \times 900\Omega = -3.6 \text{ V} \quad V_L = -\left(V_{I_s} + V_f\right) = 3.6\text{V} \quad I_{V_s} = 0 \text{ mA}$$

$$I_2 = I_{V_s} = 0 \text{ mA} \quad I_f = -I_s = -4 \text{ mA} \quad I_L = \frac{V_L}{R_L} = \frac{3.6\text{V}}{50\Omega} = 72 \text{ mA}$$

(c) With both the voltage and current source active what is the power absorbed by the load resistor R_L?

$$P_{R_L} = \frac{V_L^2}{R_L} = \frac{(8.0667 \text{ V} + 3.6 \text{ V})^2}{50 \ \Omega} = 2.7224 \text{ W}$$

$V_s = 11$ V , $I_s = 4$ mA , $R_1 = 200$ Ω
$R_2 = 550$ Ω , $R_f = 900$ Ω , $R_L = 50$ Ω



Solution of ECE 300 Test 4 S11

1. With reference to the circuit below fill in the blanks with numbers.

(a) With the voltage source V_s acting alone find these voltages and currents.

$$V_1 = V_s \frac{R_1}{R_1 + R_2} = 7 \frac{200}{200 + 550} = 1.8667 \text{ V} \quad V_2 = V_s \frac{R_2}{R_1 + R_2} = 7 \frac{550}{200 + 550} = 5.133 \text{ V} \quad V_{I_s} = -V_2 = -5.133 \text{ V}$$

$$V_f = I_f R_f = 0 \times 900\Omega = 0 \text{ V} \quad V_L = -\left(V_{I_s} + V_f\right) = 5.133\text{V} \quad I_{V_s} = \frac{V_s}{R_1 + R_2} = \frac{7\text{V}}{750\Omega} = 9.33 \text{ mA}$$

$$I_2 = I_{V_S} = 9.33 \text{ mA} \quad I_f = 0\text{A} \quad I_L = \frac{V_L}{R_L} = \frac{5.133\text{V}}{50\Omega} = 102.67 \text{ mA}$$

(b) With the current source I_s acting alone find these voltages and currents.

$$V_1 = 0 \text{ V} \quad V_2 = 0 \text{ V} \quad V_{I_s} = -V_2 = 0 \text{ V}$$

$$V_f = I_f R_f = -6\text{mA} \times 900\Omega = -5.4 \text{ V} \quad V_L = -\left(V_{I_s} + V_f\right) = 5.4\text{V} \quad I_{V_s} = 0 \text{ mA}$$

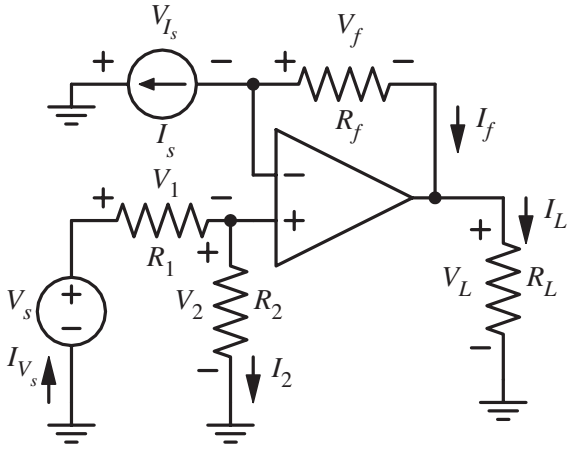
$$I_2 = I_{V_S} = 0 \text{ mA} \quad I_f = -I_s = -6 \text{ mA} \quad I_L = \frac{V_L}{R_L} = \frac{5.4\text{V}}{50\Omega} = 108 \text{ mA}$$

(c) With both the voltage and current source active what is the power absorbed by the load resistor R_L?

$$P_{R_L} = \frac{V_L^2}{R_L} = \frac{(5.133 \text{ V} + 5.4 \text{ V})^2}{50 \ \Omega} = 2.2189 \text{ W}$$

$V_s = 7$ V , $I_s = 6$ mA , $R_1 = 200\ \Omega$

$R_2 = 550\ \Omega$, $R_f = 900\ \Omega$, $R_L = 50\ \Omega$



Solution of ECE 300 Test 4 S11

1. With reference to the circuit below fill in the blanks with numbers.

(a) With the voltage source V_s acting alone find these voltages and currents.

$$V_1 = V_s \frac{R_1}{R_1 + R_2} = 16 \frac{200}{200 + 550} = 4.267 \text{ V} \quad V_2 = V_s \frac{R_2}{R_1 + R_2} = 16 \frac{550}{200 + 550} = 11.733 \text{ V} \quad V_{I_s} = -V_2 = -11.733 \text{ V}$$

$$V_f = I_f R_f = 0 \times 900\Omega = 0 \text{ V} \quad V_L = -\left(V_{I_s} + V_f\right) = 11.733 \text{ V} \quad I_{V_s} = \frac{V_s}{R_1 + R_2} = \frac{16\text{V}}{750\Omega} = 21.33 \text{ mA}$$

$$I_2 = I_{V_s} = 21.33 \text{ mA} \quad I_f = 0\text{A} \quad I_L = \frac{V_L}{R_L} = \frac{11.733\text{V}}{50\Omega} = 234.7 \text{ mA}$$

(b) With the current source I_s acting alone find these voltages and currents.

$$V_1 = 0 \text{ V} \quad V_2 = 0 \text{ V} \quad V_{I_s} = -V_2 = 0 \text{ V}$$

$$V_f = I_f R_f = -8\text{mA} \times 900\Omega = -7.2 \text{ V} \quad V_L = -\left(V_{I_s} + V_f\right) = 7.2\text{V} \quad I_{V_s} = 0 \text{ mA}$$

$$I_2 = I_{V_s} = 0 \text{ mA} \quad I_f = -I_s = -8 \text{ mA} \quad I_L = \frac{V_L}{R_L} = \frac{7.2\text{V}}{50\Omega} = 144 \text{ mA}$$

(c) With both the voltage and current source active what is the power absorbed by the load resistor R_L?

$$P_{R_L} = \frac{V_L^2}{R_L} = \frac{(11.733 \text{ V} + 7.2 \text{ V})^2}{50 \ \Omega} = 7.169 \text{ W}$$

$V_s = 16$ V , $I_s = 8$ mA , $R_1 = 200\ \Omega$

$R_2 = 550\ \Omega$, $R_f = 900\ \Omega$, $R_L = 50\ \Omega$