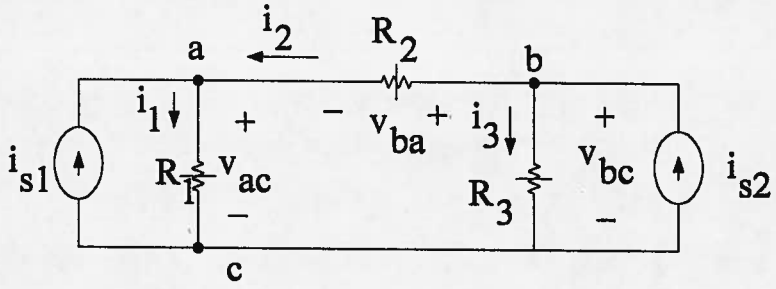
Elec275 – Principles of Electrical Engg
Fall 2014 – Quiz 1(b)

1. For the network shown below, (a) the various component values are given as: $i_{s1} = 2$ mA, $R_1 = 6$k ohms, $R_2 = 10$k ohms, $R_3 = 8$k ohms. Determine the value of i_{s2} so that $v_{ba} = 10$ volts. (Use only KCL, KVL and/or OL). (b) Also, determine the power dissipated in each of the resistances R_1, R_2 and R_3.

(5 marks)



a)

Solution: $i_2 = \frac{V_{ba}}{R_2} = \frac{10}{10^k} = 1\ (mA)$

kcl @ node a: $i_{s_1} + i_2 - i_1 = 0$

$i_1 = 2 + 1 = 3\ (mA)$

kvl around bacb: $V_{ba} + V_{ac} = V_{bc}$

$i_2 R_2 + i_1 R_1 = i_3 R_3$

$V_{bc} = 28\ (V) \Longrightarrow i_3 = \frac{28}{8} = 3.5\ (mA)$

kcl @ node b: $i_2 + i_3 = i_{s_2}$

$i_{s_2} = 4.5\ (mA)$

b) $P_{R_1} = i_1^2 R_1 = 54\ (mw)$

$P_{R_2} = i_2^2 R_2 = 10\ (mw)$

$P_{R_3} = i_3^2 R_3 = 98\ (mA)$