Homework-1

1. For the circuit given in Figure 1, obtain the equations to analysis the circuit using Chord (Line) current method such that unknown variables are i_6, i_7 and i_8 ($V_3 = \alpha i_4$, $V_4 = \beta V_8$, $V_5 = \beta i_7$).

2. For the circuit given in Figure 3, obtain the equations to analysis the circuit using Generalized Branch Voltages method such that unknown variables are v_1, v_2 and v_3 ($i_4 = \beta i_5$, $i_5 = v_5$).

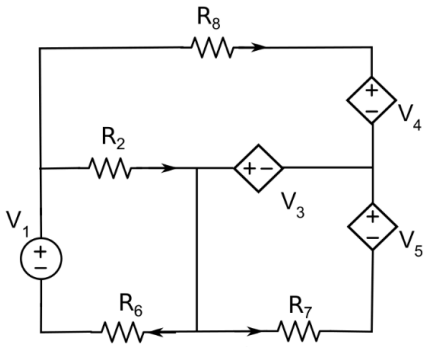

Figure 1

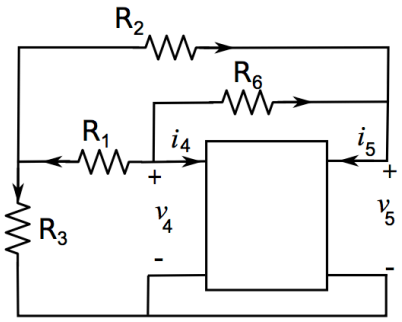

Figure 3

P 6.4-23 The input to the circuit shown in Figure P 6.4-23 is the voltage source voltage v_s. The output is the node voltage v_o The output is related to the input by the equation $v_o = kv_s$ where $k = \frac{v_o}{v_s}$ is called the gain of the circuit. Determine the value of the gain k.

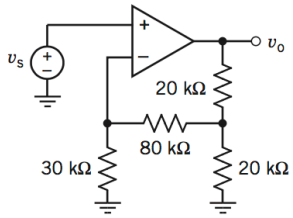

Figure P 6.4-23

P 6.5-11 The circuit shown in Figure P 6.5-11 is called a Howland current source. It has one input, v_{in}, and one output, i_{out}. Show that when the resistances are chosen so that $R_2R_3 = R_1R_4$, the output is related to the input by the equation

$$i_{out} = \frac{v_{in}}{R_1}$$

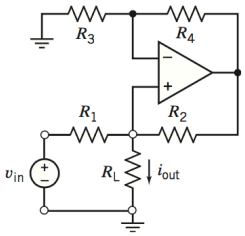

Figure P 6.5-11

P 6.4-19 The circuit shown in Figure P 6.4-19 has one input, v_s, and one output, v_o. The circuit contains one unspecified resistance, R.

(a) Express the gain of the circuit v_o/v_s in terms of the resistance R.

(b) Determine the range of values of the gain that can be obtained by specifying a value for the resistance R.

(c) Design the circuit so that $v_o = -3v_s$.

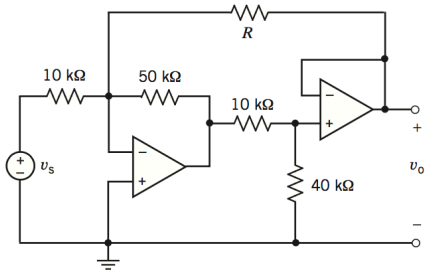

Figure P 6.4-19