Problems

2.1 For the circuit shown in Fig. P2.1, select node d as the reference node. (a) Use nodal analysis to find the node voltages. (b) Use the node voltages to determine $i_1$, $i_2$, $i_3$, and $i_4$.

![Fig. P2.1](image1)

2.6 Find the node voltages for the circuit shown in Fig. P2.6.

![Fig. P2.6](image2)

2.7 Find the node voltages for the circuit shown in Fig. P2.7. (See p. 100.)

2.8 Find the node voltages for the circuit shown in Fig. P2.8.

![Fig. P2.8](image3)

2.9 Find the node voltages for the circuit shown in Fig. P2.9.

![Fig. P2.9](image4)
2.10 Find the node voltages for the circuit shown in Fig. P2.10.

Fig. P2.10

2.12 Fig. P2.11 shows a single transistor amplifier circuit where the portion in the shaded box is the hybrid- or h-parameter model of a BJT. Note that $h_i$ is a resistance and $h_o$ is a conductance. Use nodal analysis to show that the voltage gain $v_2/v_1$ of this amplifier is

$$\frac{v_2}{v_1} = \frac{-h_f R_L}{h_i + (h_i h_o - h_f h_o)R_L}$$

2.13 Fig. P2.11 shows a single transistor amplifier circuit where the portion in the shaded box is the hybrid- or h-parameter model of a BJT. Note that $h_i$ is a resistance and $h_o$ is a conductance. Use the result given in Problem 2.12 to show that the input resistance $v_1/i_1$ of this amplifier is

$$\frac{v_1}{i_1} = h_i - \frac{h_f h_o}{h_o + 1/R_L}$$

2.14 The circuit shown in Fig. P2.14 is a single BJT amplifier with “feedback.” The portion of the circuit in the shaded box is an approximate T-model of a transistor in the common-emitter configuration. (a) Use nodal analysis to find the voltage gain