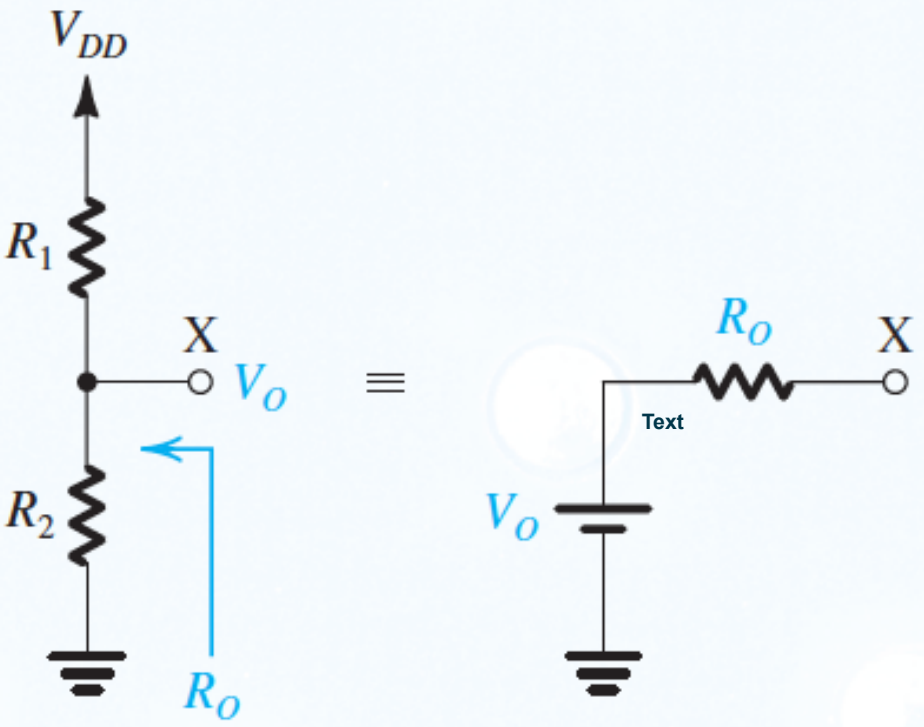
EE303 - Problem Set

1.6 Figure P1.6(a) shows a two-resistor voltage divider. Its function is to generate a voltage V_o (smaller than the power-supply voltage $|V_{DD}$) at its output node X. The circuit looking back at node X is equivalent to that shown in Fig. P1.6(b). Observe that this is the Thévenin equivalent of the voltage divider circuit. Find expressions for V_o and R_o.



(a) (b)

Figure P1.6

1.10 Current dividers play an important role in circuit design. Therefore it is important to develop a facility for dealing with current dividers in circuit analysis. Figure P1.10 shows a two-resistor current divider fed with an ideal current source I. Show that

$$I_1 = \frac{R_2}{R_1 + R_2} I$$

$$I_2 = \frac{R_1}{R_1 + R_2} I$$

and find the voltage V that develops across the current divider.

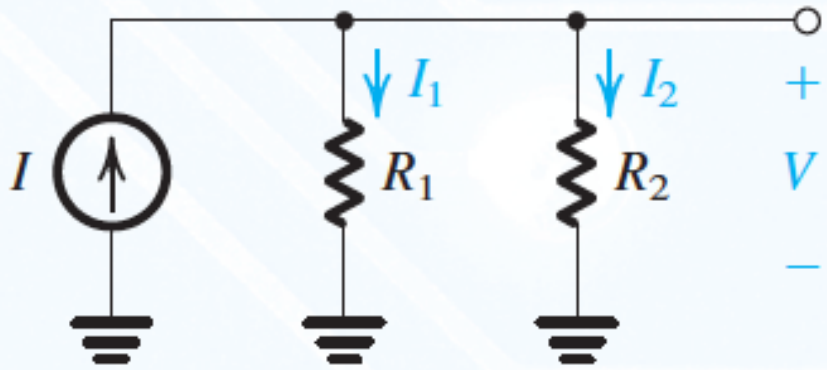


Figure P1.10

1.14 For the circuit in Fig. P1.14, find the Thévenin equivalent circuit between terminals (a) 1 and 2, (b) 2 and 3, and (c) 1 and 3.

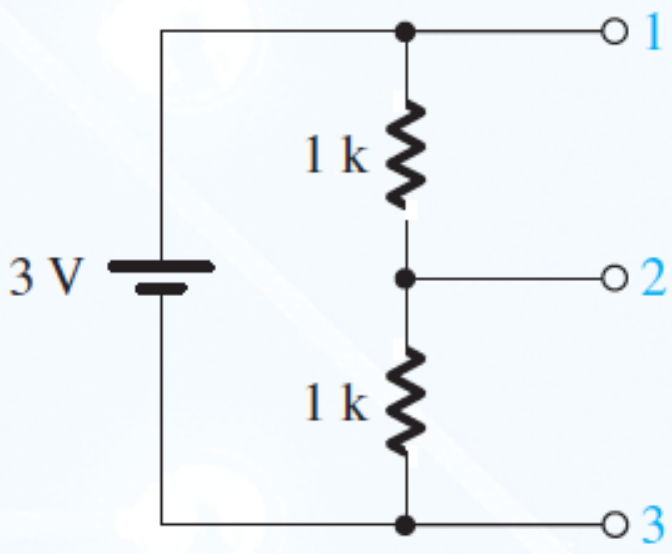


Figure P1.14

1.28 For the following peak or rms values of some important sine waves, calculate the corresponding other value:

(a) 117 V rms, a household-power voltage in North America

(b) 33.9 V peak, a somewhat common peak voltage in rectifier circuits

(c) 220 V rms, a household-power voltage in parts of Europe

(d) 220 kV rms, a high-voltage transmission-line voltage in North America

1.29 Give expressions for the sine-wave voltage signals having:

(a) 10-V peak amplitude and 10-kHz frequency
(b) 120-V rms and 60-Hz frequency
(c) 0.2-V peak-to-peak and 1000-rad/s frequency
(d) 100-mV peak and 1-ms period