3.51. In the circuit of Fig. 3.87, $R_1 = 500\,\Omega$ and $R_2 = 1\,\text{k}\Omega$. Use SPICE to construct the input/output characteristic for $-2\,\text{V} < V_{in} < +2\,\text{V}$. Also, plot the current flowing through R_1 as a function of V_{in}.

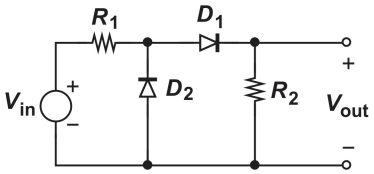


Figure 3.87

3.52. The rectifier shown in Fig. 3.88 is driven by a 60-Hz sinusoid input with a peak amplitude of 5 V. Using the transient analysis in SPICE,

(a) Determine the peak-to-peak ripple at the output.

(b) Determine the peak current flowing through D_1.

(c) Compute the heaviest load (smallest R_L) that the circuit can drive while maintaining a ripple less than 200 mV_{pp}.

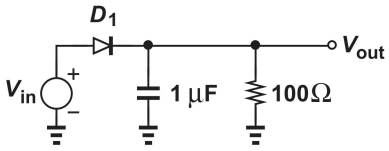


Figure 3.88

3.53. The circuit of Fig. 3.89 is used in some analog circuits. Plot the input/output characteristic for $-2\,\text{V} < V_{in} < +2\,\text{V}$ and determine the maximum input range across which $|V_{in} - V_{out}| < 5\,\text{mV}$.

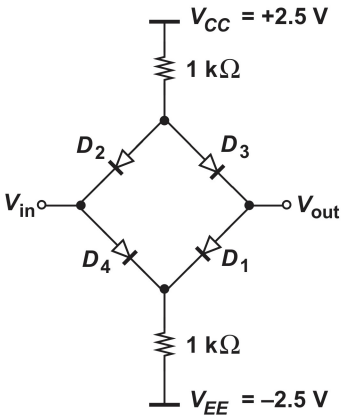
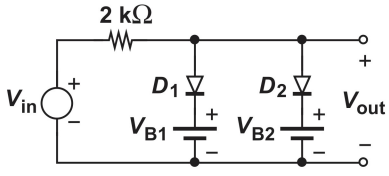
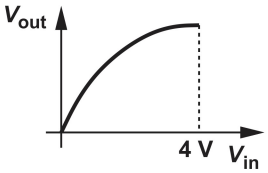


Figure 3.89

3.54. The circuit shown in Fig. 3.90 can provide an approximation of a sinusoid at the output in response to a triangular input waveform. Using the dc analysis in SPICE to plot the input/output characteristic for $0 < V_{in} < 4\,\text{V}$, determine the values of V_{B1} and V_{B2} such that the characteristic closely resembles a sinusoid.



(a)



(b)

Figure 3.90