The solution for v_x and i_x occurs at the intersection of the device and load-line characteristics: $i_x \approx 0.12$ A, $v_x \approx 0.9$ V.

CHECK YOUR UNDERSTANDING

Knowing that the load i-v characteristic is given exactly by the expression $i_x = 0.14 - 0.03v_x^2$, determine the load current i_x. [*Hint:* Assume that only positive solutions are possible, given the polarity of the generator.]

Answer: $i_x = 0.116$ A

Conclusion

The objective of this chapter is to provide a practical introduction to the analysis of linear resistive circuits. The emphasis on examples is important at this stage, since we believe that familiarity with the basic circuit analysis techniques will greatly ease the task of learning more advanced ideas in circuits and electronics. In particular, your goal at this point should be to have mastered six analysis methods, summarized as follows:

1., 2. *Node voltage and mesh current analysis.* These methods are analogous in concept; the choice of a preferred method depends on the specific circuit. They are generally applicable to the circuits we analyze in this book and are amenable to solution by matrix methods.

3. *The principle of superposition.* This is primarily a conceptual aid that may simplify the solution of circuits containing multiple sources. It is usually not an efficient method.

4. *Thévenin and Norton equivalents.* The notion of equivalent circuits is at the heart of circuit analysis. Complete mastery of the reduction of linear resistive circuits to either equivalent form is a must.

5. *Maximum lower transfer.* Equivalent circuits provide a very clear explanation of how power is transferred from a source to a load.

6. *Numerical and graphical analysis.* These methods apply in the case of nonlinear circuit elements. The load-line analysis method is intuitively appealing and is employed again in this book to analyze electronic devices.

The material covered in this chapter is essential to the development of more advanced techniques throughout the remainder of the book.

HOMEWORK PROBLEMS

Sections 3.2 through 3.4: Node Mesh Analysis

3.1 Use node voltage analysis to find the voltages V_1 and V_2 for the circuit of Figure P3.1.

3.2 Using node voltage analysis, find the voltages V_1 and V_2 for the circuit of Figure P3.2.

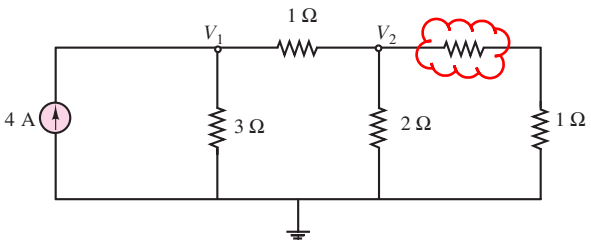

Figure P3.1