## SECTION 2.4 **Review**

### TECHNIQUES

- Generate values in a sequence defined recursively.
- Prove properties of the Fibonacci sequence.
- W • Recognize objects in a recursively defined collection of objects.
- Give recursive definitions for particular sets of objects.
- Give recursive definitions for certain operations on objects.
- Write recursive algorithms to generate sequences defined recursively.

### MAIN IDEAS

- Recursive definitions can be given for sequences of objects, sets of objects, and operations on objects where basis information is known and new information depends on already known information.
- Recursive algorithms provide a natural way to solve certain problems by invoking the same task on a smaller version of the problem.

### EXERCISES 2.4

For Exercises 1–10, write the first five values in the sequence.

★ 1. $S(1) = 10$
$S(n) = S(n - 1) + 10$ for $n \geq 2$

2. $A(1) = 2$
$A(n) = \dfrac{1}{A(n - 1)}$ for $n \geq 2$

3. $B(1) = 1$
$B(n) = B(n - 1) + n^2$ for $n \geq 2$

★ 4. $S(1) = 1$
$S(n) = S(n - 1) + \dfrac{1}{n}$ for $n \geq 2$

5. $T(1) = 1$
$T(n) = nT(n - 1)$ for $n \geq 2$

6. $P(1) = 1$
$P(n) = n^2P(n - 1) + (n - 1)$ for $n \geq 2$

★ 7. $M(1) = 2$
$M(2) = 2$
$M(n) = 2M(n - 1) + M(n - 2)$ for $n > 2$

8. $D(1) = 3$
$D(2) = 5$
$D(n) = (n - 1)D(n - 1) + (n - 2)D(n - 2)$ for $n > 2$

9. $W(1) = 2$
$W(2) = 3$
$W(n) = W(n - 1)W(n - 2)$ for $n > 2$