

3. A vending machine dispensing books of stamps accepts only one-dollar coins, \$1 bills, and \$5 bills.
- a) Find a recurrence relation for the number of ways to deposit  $n$  dollars in the vending machine, where the order in which the coins and bills are deposited matters.
  - b) What are the initial conditions?
  - c) How many ways are there to deposit \$10 for a book of stamps?
4. A country uses as currency coins with values of 1 peso, 2 pesos, 5 pesos, and 10 pesos and bills with values of 5 pesos, 10 pesos, 20 pesos, 50 pesos, and 100 pesos. Find a recurrence relation for the number of ways to pay a bill of  $n$  pesos if the order in which the coins and bills are paid matters.
7. a) Find a recurrence relation for the number of bit strings of length  $n$  that contain a pair of consecutive 0s.
- b) What are the initial conditions?
  - c) How many bit strings of length seven contain two consecutive 0s?
9. a) Find a recurrence relation for the number of bit strings of length  $n$  that do not contain three consecutive 0s.
- b) What are the initial conditions?
  - c) How many bit strings of length seven do not contain three consecutive 0s?
11. a) Find a recurrence relation for the number of ways to climb  $n$  stairs if the person climbing the stairs can take one stair or two stairs at a time.
- b) What are the initial conditions?
  - c) In how many ways can this person climb a flight of eight stairs?

A string that contains only 0s, 1s, and 2s is called a **ternary string**.

- 13. a)** Find a recurrence relation for the number of ternary strings of length  $n$  that do not contain two consecutive 0s.
- b)** What are the initial conditions?
- c)** How many ternary strings of length six do not contain two consecutive 0s?
- 15. a)** Find a recurrence relation for the number of ternary strings of length  $n$  that do not contain two consecutive 0s or two consecutive 1s.
- b)** What are the initial conditions?
- c)** How many ternary strings of length six do not contain two consecutive 0s or two consecutive 1s?
- 17. a)** Find a recurrence relation for the number of ternary strings of length  $n$  that do not contain consecutive symbols that are the same.
- b)** What are the initial conditions?
- c)** How many ternary strings of length six do not contain consecutive symbols that are the same?
- 19.** Messages are transmitted over a communications channel using two signals. The transmittal of one signal requires 1 microsecond, and the transmittal of the other signal requires 2 microseconds.
- a)** Find a recurrence relation for the number of different messages consisting of sequences of these two signals, where each signal in the message is immediately followed by the next signal, that can be sent in  $n$  microseconds.
- b)** What are the initial conditions?
- c)** How many different messages can be sent in 10 microseconds using these two signals?