**25.** For each of these lists of integers, provide a simple formula or rule that generates the terms of an integer sequence that begins with the given list. Assuming that your formula or rule is correct, determine the next three terms of the sequence.

**a)** 1, 0, 1, 1, 0, 0, 1, 1, 1, 0, 0, 0, 1, …
**b)** 1, 2, 2, 3, 4, 4, 5, 6, 6, 7, 8, 8, …
**c)** 1, 0, 2, 0, 4, 0, 8, 0, 16, 0, …
**d)** 3, 6, 12, 24, 48, 96, 192, …
**e)** 15, 8, 1, −6, −13, −20, −27, …
**f)** 3, 5, 8, 12, 17, 23, 30, 38, 47, …

**13.** What are the quotient and remainder when

**a)** 19 is divided by 7?
**b)** −111 is divided by 11?
**c)** 789 is divided by 23?
**d)** 1001 is divided by 13?
**e)** 0 is divided by 19?
**f)** 3 is divided by 5?
**g)** −1 is divided by 3?
**h)** 4 is divided by 1?

**31.** Find the integer $a$ such that

**a)** $a \equiv -15 \pmod{27}$ and $-26 \leq a \leq 0$.
**b)** $a \equiv 24 \pmod{31}$ and $-15 \leq a \leq 15$.
**c)** $a \equiv 99 \pmod{41}$ and $100 \leq a \leq 140$.

**4.** Convert the binary expansion of each of these integers to a decimal expansion.

**a)** $(1\ 1011)_2$
**b)** $(10\ 1011\ 0101)_2$
**c)** $(11\ 1011\ 1110)_2$
**d)** $(111\ 1100\ 0001\ 1111)_2$

**3.** Find the prime factorization of each of these integers.

**a)** 88
**b)** 126
**c)** 729
**d)** 1001
**e)** 1111
**f)** 909,090

**17.** Determine whether the integers in each of these sets are pairwise relatively prime.

**a)** 11, 15, 19

**b)** 14, 15, 21

**c)** 12, 17, 31, 37

**d)** 7, 8, 9, 11

**25.** What are the greatest common divisors of these pairs of integers?

**a)** $3^7 \cdot 5^3 \cdot 7^3, 2^{11} \cdot 3^5 \cdot 5^9$

**b)** $11 \cdot 13 \cdot 17, 2^9 \cdot 3^7 \cdot 5^5 \cdot 7^3$

**c)** $23^{31}, 23^{17}$

**d)** $41 \cdot 43 \cdot 53, 41 \cdot 43 \cdot 53$

**e)** $3^{13} \cdot 5^{17}, 2^{12} \cdot 7^{21}$

**f)** 1111, 0

**27.** What is the least common multiple of each pair in Exercise 25?