Show All Solutions

Rosen, Discrete Mathematics and Its Applications, 8th edition
Extra Examples
Section 4.1—Divisibility and Modular Arithmetic

Extra Examples — *Page references correspond to locations of Extra Examples icons in the textbook.*

---

p.252, icon at Example 2
#1. Certain rules allow us to determine by inspection when a positive integer n is divisible by a positive integer k. For example, $5 \mid n$ if and only if n ends in the digit 5 or 0. Similarly, $2 \mid n$ if and only if n ends in one of the digits 0, 2, 4, 6, 8.
There is also a rule to determine divisibility by 3:

$$3 \mid n \text{ if and only if the sum of the digits in } n \text{ is divisible by 3.}$$

For example $3 \mid 478,125$ because the sum of the six digits in $478,125$ is 27, which is divisible by 3. Why does the rule work?

See Solution

p.252, icon at Example 2
#2.

(a) Find the number of positive integer divisors of $648 = 2^3 3^4$.
(b) Find the sum of all positive integer divisors of 648.

See Solution

---

p.254, icon at Example 4
#1. For each pair of numbers, when the division algorithm is used to divide a by d, what are the quotient q and remainder r?

(a) $a = 88$, $d = 11$.
(b) $a = -29$, $d = 9$
(c) $a = 58^{237}$, $d = 58^{168}$

See Solution

Show All Solutions

Rosen, Discrete Mathematics and Its Applications, 8th edition
Extra Examples
Section 4.2—Integer Representation and Algorithms

Extra Examples — *Page references correspond to locations of Extra Examples icons in the textbook.*

---

p.261, icon at Example 4
#1. Find the decimal expansion of $(D5A3)_{16}$.

See Solution

---

p.261, icon at Example 4
#2. Find the hexadecimal expansion of $(35{,}491)_{10}$.

See Solution

---

p.261, icon at Example 4
#3. Find the binary expansion of 547.

See Solution

---

p.261, icon at Example 4

#4. Find values a, b, and c (not all 0) such that $(abc)_5 = (cba)_8$, or prove that there are none.

See Solution

Show All Solutions

Rosen, Discrete Mathematics and Its Applications, 8th edition
Extra Examples
Section 4.3—Primes and Greatest Common Divisors

Extra Examples — *Page references correspond to locations of Extra Examples icons in the textbook.*

---

p.272, icon at Example 2
#1. Find the prime factorization of:

(a) 487.
(b) 6600.

See Solution

---

p.278, icon at Example 6
#1. Suppose the odd primes $3, 5, 7, 11, 13, 17, \ldots$ in order of increasing size are $p_1, p_2, p_3, \ldots$. Prove or disprove:

$$p_1 p_2 p_3 \ldots p_k + 2 \text{ is prime, for all } k \geq 1.$$

See Solution

p.278, icon at Example 6

#2. Suppose the odd primes $3, 5, 7, 11, 13, 17, \ldots$ in order of increasing size are $p_1, p_2, p_3 \ldots$. Prove or disprove:

$$p_i p_{i+1} + 2 \text{ is prime, for all } i \geq 1.$$

See Solution

p.278, icon at Example 6

#3. (Problem A1 from the 1989 William Lowell Putnam Mathematics Competition.) Consider the sequence of integers (in base 10): $101, 10101, 1010101, 101010101, 10101010101, \ldots$. Prove that 101 is the only number in this sequence that is prime. (*Hint*: Use place value to write each number in terms of the sum of its digits; for example, $abcde = a10^4 + b10^3 + c10^2 + d10 + e$. Then examine how the sum might be factored.)

See Solution