Show All Solutions

Rosen, Discrete Mathematics and Its Applications, 8th edition
Extra Examples
Section 3.1—Algorithms

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

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p.202, icon at Example 1
#1.

(a) Describe an algorithm that determines the location of the last even integer in a nonempty list $a_1, a_2, \ldots, a_n$ of integers. (If no integer in the list is even, the output should be that the location is 0.)
(b) Describe the algorithm, with "last" replaced by "first".

See Solution

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p.202, icon at Example 1
#2. Describe an algorithm that takes as input a sequence of distinct integers $a_1, a_2, \ldots, a_n$ ($n \geq 2$) and determines if the integers are in increasing order.

See Solution

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p.202, icon at Example 1

#3. Describe an algorithm that takes as input a positive integer n and gives as output the tens' digit of n. For example, if the input is the positive integer 3752, the output is 5; if the input is the positive integer 4, the output is 0 (because we can think of 4 as 04).

See Solution

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p.202, icon at Example 1

#4. Describe an algorithm that takes as input a list of integers $a_1, a_2, \ldots, a_n$ (where $n > 2$) and determines if some a_i is equal to the average of an earlier entry in the list and a later entry in the list.

See Solution

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Extra Examples
Section 3.2—The Growth of Functions

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

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p.218, icon at Example 1
#1. Give a big-O estimate for each of these functions. Use a simple function in the big-O estimate.

(a) $3n + n^3 + 4$.
(b) $1 + 2 + 3 + \cdots + n$.
(c) $\log_{10}(2^n) + 10^{10}n^2$.

See Solution

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p.218, icon at Example 1
#2. Use the definition of big-O to prove that $5x^4 - 37x^3 + 13x - 4 = O(x^4)$

See Solution

p.218, icon at Example 1

#3. Suppose we wish to prove that $f(x) = 2x^2 + 5x + 9$ is big-O of $g(x) = x^2$ and want to use $C = 3$ in the big-O definition. Find a value k such that $|f(x)| \leq 3|g(x)|$ for all $x > k$.

See Solution

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p.218, icon at Example 1

#4. Use the definition of big-O to prove that $\dfrac{3x^4 - 2x}{5x - 1}$ is $O(x^3)$.

See Solution

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p.227, icon at Example 12

#1. Show that the sum of the squares of the first n odd positive integers is of order n^3.

See Solution

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p.228, icon at Example 13

#1. Use the definition of big-theta to prove that $7x^2 + 1$ is $\Theta(x^2)$.

See Solution

Show All Solutions

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Extra Examples
Section 3.3—Complexity of Algorithms

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

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p.232, icon at Example 1
#1. Determine the complexity function that measures the number of print statements in an algorithm that takes a positive integer n and prints one 1, two 2's, three 3's,..., n n's.

See Solution

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p.232, icon at Example 1
#2. Suppose an algorithm takes a sequence of n (≥ 2) integers and determines if it contains an integer that is a repeat of the first integer in the list. Find the complexity function for the:

(a) best case analysis.
(b) worst case analysis.

See Solution
