CS211: Algorithms & Data structures

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Lab01 Solution

1. Find the maximum of three numbers?

Algorithm 1: Finding the maximum number of three numbers
Input:a, b, and c, are three numbers
Output: max, the maximum number
1: $max \leftarrow a$
2: **if** $b > max$ **then**
3:    $max \leftarrow b$
4: **end if**
5: **if** $c > max$ **then**
6:    $max \leftarrow c$
7: **end if**
8: **return** max

2. Find the maximum number in an array?

Algorithm 2: Finding the maximum number
Input:$(a_1, a_2, \ldots, a_n)$, an array of n elements
Output: max, the maximum number in a
1: $max \leftarrow a_1$
2: **for** $i \leftarrow 2$ to n **do**
3:    **if** $a_i > max$ **then**
4:      $max \leftarrow a_i$
5:    **end if**
6: **end for**
7: **return** max

3. Write a pseudocode to find out whether a given number is even or odd?

Algorithm 3: Finding whether a given number is even or odd

    Input:a, is a positive integer number $(\mathbf{Z^+})$
    Output: "$even$" or "odd"
1: **if** $a \bmod 2 = 0$ **then**
2:    **return** "$even$"
3: **else**
4:    **return** "odd"
5: **end if**

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4. Wrtite a pseudocode to find odd and even numbers of first n ?

Algorithm 4: Finding odd and even numbers of first n

    Input:n, is a positive integer number $(\mathbf{Z^+})$
    Output: "$even$" or "odd"
1: **for** $i \leftarrow 1$ to n **do**
2:    **if** $i \bmod 2 = 0$ **then**
3:      Print i is "$even$"
4:    **else**
5:      Print i is "odd"
6:    **end if**
7: **end for**

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5. Write a pseudocode to find out whether a given number is prime or not?

Algorithm 5: Finding whether a number is prime or not

    Input:a, is a positive integer number $(\mathbf{Z^+})$
    Output: "$true$", if a is prime, "$false$" , if a is not prime
1: **for** $i \leftarrow 2$ to $a - 1$ **do**
2:    **if** $a \bmod i = 0$ **then**
3:      **return** "$true$"
4:    **end if**
5: **end for**
6: **return** "$false$"

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6. Write an algorithm to calculate the factorial of a number?

Algorithm 6: Finding factorial of a number

    Input:n, is a positive integer number $(\mathbf{Z^+})$
    Output: f, is the factorial of n, $n!$
1: $f \leftarrow 1$
2: **for** $i \leftarrow 2$ to n **do**
3:    $f \leftarrow f \times i$
4: **end for**
5: **return** f

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7. Write a pseudocode to calculate the power of a number?

Algorithm 7: Computing the power of a number

Input:x, is a real number $x \in \mathbf{R}$, n is an integer number, $n \in \mathbf{Z}$
Output: x^n
1: $p \leftarrow 1$
2: **for** $i \leftarrow 1$ to n **do**
3: $\quad p \leftarrow p \times x$
4: **end for**
5: **return** p

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8. Write a pseudocode to compute the sum of numbers?

Algorithm 8: Computing the sum of numbers

Input:$(a_1, a_2, \ldots, a_n)$, is a an array of numbers
Output: sum
1: $sum \leftarrow 0$
2: **for** $i \leftarrow 1$ to n **do**
3: $\quad sum \leftarrow sum + a_i$
4: **end for**
5: **return** sum

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9. Write a pseudocode to find the average of a given set of numbers?

Algorithm 9: Computing the average of numbers

Input:$(a_1, a_2, \ldots, a_n)$, is a an array of numbers
Output: avg
1: $sum \leftarrow 0$
2: **for** $i \leftarrow 1$ to n **do**
3: $\quad sum \leftarrow sum + a_i$
4: **end for**
5: $avg \leftarrow sum/n$
6: **return** avg