CS211: Algorithms & Data structures

Dr. Sameer M. Alrehaili

November 7, 2021

srehaili@taibahu.edu.sa
college of computer science and engineering ,yanbu, Taibah University

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 ← a
2: if b > max then
3:     max ← b
4: end if
5: if c > max then
6:     max ← 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 ← a_1
2: for i ← 2 to n  do
3:     if a_i > max then
4:         max ← 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 ($\boldsymbol{Z}^+$)
Output: "$even$" or "odd"

```
1: if a mod 2 = 0 then
2:     return "even"
3: else
4:     return "odd"
5: end if
```

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 ($\boldsymbol{Z}^+$)
Output: "$even$" or "odd"

```
1: for i ← 1 to n do
2:     if i mod 2 = 0 then
3:         Print i is "even"
4:     else
5:         Print i is "odd"
6:     end if
7: end for
```

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 ($\boldsymbol{Z}^+$)
Output: "$true$", if a is prime, "$false$" , if a is not prime

```
1: for i ← 2 to a − 1 do
2:     if a mod i = 0 then
3:         return "false"
4:     end if
5: end for
6: return "true"
```

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 ($\boldsymbol{Z}^+$)
Output: f, is the factorial of n, $n!$

```
1: f ← 1
2: for i ← 2 to n do
3:     f ← f × i
4: end for
5: return f
```

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 $x \in \boldsymbol{R}$, n is an integer number, $n \in \boldsymbol{Z}$
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

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

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