MAT2440, Classwork26, Spring2025

ID:_____ Name:_____

1. The definition of an **Algorithm**:

   An _algorithm_ is a finite sequence of precise instructions for performing a computation or for solving a problem.

2. The introduction of **Pseudocode**:

   Algorithms in English ➖➖➤ _Pseudocode_ ➖➖➤ Programming language

3. The structure of a pseudocode (procedure, statements, and return):

   procedure: Name of the code (input: description of input(s))

   statements: Assignments

   Conditional statement (**if** condition **then** statement)

   Loop Constructions (**for** loop, **while** loop)

   return: Variable which is the output(s)

4. A pseudocode of summation:

procedure *summation*($a_1, a_2, \cdots, a_n$: a list of n numbers)
$n :=$ the length of $\{a_i\}$
sum := _____ (which is a variable to store the summation)
for $i := 1$ **to** _____ (a **for** loop)
    sum := *sum* $+a_i$ (adding each number to *sum*)
return _____

How does this pseudocode work?

Initialization: _____

i	*sum*
$i = 1$	*sum* $+a_1 = 0 + a_1 =$ ____
$i = 2$	*sum* $+a_2 =$ _____
⋮	⋮
$i = n$	*sum* $+a_n =$ _____

Return: *sum* = _____

5. Algorithm and Pseudocode of **Finding the Maximum Element in a Finite Sequence**.

Problem: Let $a_1, a_2, \cdots, a_n$ be a list of n numbers. Find the largest value of them.

Algorithm:

(1) Set temporary maximum *tempMax* equals the _____ element ____
(2) Compare a_2 to *tempMax:*
if $a_2 >$ *tempMax* , then *tempMax* = _____.
if $a_2 <$ *tempMax* , then do _____.
(3) Repeat the previous step for ___, ___, ⋯, ___.
(4) The variable *tempMax* at this point contains the largest value in the sequence.

Pseudocode:

procedure *max*($a_1, a_2, \cdots, a_n$: a list of n numbers)
$n :=$ the _____ of $\{a_i\}$
tempMax := ____
for $i :=$____ **to** ____
    if *tempMax* $< a_i$ **then** *tempMax* $:= a_i$
return _____{ *tempMax* is the largest element}

6. An example of finding the maximum element in a finite sequence:

Let the sequence be $\{3, 1, 5, 6, 4\}$.

Initialization: *tempMax* = ___ and $n =$ ___.

i	a_i	*tempMax* $< a_i$ (T or F?)	*tempMax*
$i = 2$			
$i = 3$			
$i = 4$			
$i = 5$			

Return: *tempMax* = _____.

7. Write down an algorithm of **finding the Minimum Element in a Finite Sequence**.