Unit 3

Practice III

Algorithms

**Goal of the practice**

Become familiar with the writing of algorithms in pseudo code and the logic required to program. Handle the agreed nomenclature.

Management of the basic data types and their correct application.

Using advanced flow control cycles and actions.

Understanding expressions and properly apply the precedence of operators.

1. What are the differences and similarities between an identifier and a reserved word.
2. Create an algorithm to determine the largest of 3 numbers.

var number : greatest = 0

var number : count = 0

var number : value

WHILE (count < 3) DO

READ(value)

IF (count == 0) THEN

greatest = value

ELSE

IF (greatest < value) THEN

greatest = value

ENDIF

ENDIF

count = count + 1

END WHILE

PRINT("The largest number is " + greatest)

1. Create an algorithm to determine the largest of a series of numbers that are read from the keyboard. The user ends by entering -1.

var number : value = 0

var number : largest = MINNIMUM VALUE

WHILE (value != -1) DO

READ(value)

IF (largest < value) THEN

largest = value

ENDIF

END WHILE

PRINT("The largest number is " + largest )

1. Write an algorithm to determine the least of a series of numbers that are read from the keyboard. The user ends by entering -1. What differences do you find with respect to the previous algorithm?

var number : value = 0

var number : least = MAXIMUM VALUE

WHILE (value != -1) DO

READ(value)

IF (least > value) THEN

least = value

ENDIF

END WHILE

PRINT("The least number is " + least)

1. Write an algorithm to print and count the multiples of 3 from 1 to a number that we enter by keyboard.

var number : count = 1

var number : countMultiples = 0

var number : number

READ(number)

WHILE (count < number) DO

if (count MOD 3 == 0) THEN

PRINT("The number " + count + " is multiple")

countMultiples = countMultiples + 1

ENDIF

count = count + 1

END WHILE

PRINT("The number of multiples is " + countMultiples)

1. Write an algorithm that reads a series of real numbers and adds them, printing the result. The series ends when the user enters the number zero

var number : sum = 0

var number : value = -1

WHILE (value != 0) DO

READ(value)

PRINT(sum + " + " + value)

sum = sum + value

END WHILE

PRINT("The result is " + sum)

1. Write an algorithm to find the average of a series of numbers that are read from the keyboard. Compare this exercise with the previous one. What are the differences and similarities?

var number : sum = 0

var number : value = -1

var number : count = 0

WHILE (value != 0) DO

READ(value)

sum = sum + value

count = count + 1

END WHILE

PRINT("The average is " + sum/count)

1. Given a series of real numbers that are being read from the keyboard, determine the maximum value and the position of it.

var number : greatest = 0

var number : count = 0

var number : position = 0

var number : value = MINUMUM\_VALUE

READ(n)

WHILE (count < n) DO

READ(value)

IF (greatest > value) THEN

greatest = value

position = count

ENDIF

count = count + 1

END WHILE

PRINT("The greatest number is " + greatest + ". It was in the position " + position)

1. Write an algorithm that requests the reading of a series of individual characters and count how many times the letter "a" is entered. The user ends by entering the "$" symbol.

var char : character = 'a'

var number : count = 0

WHILE (character != '$') DO

READ(character)

if (character == 'a') THEN

count = count + 1

ENDIF

END WHILE

PRINT("The character 'a' appears " + count + " times.")

1. Develop an algorithm to count the number of students whose weight is between 50 and 60, between 61 and 80 and between 81 and 100. The weights are entered by keyboard and report the number of students in each category of weight. How does the algorithm change if I want to accumulate weight totals for each category?

var number : count = 0

var number : n

var number : cat50to60 = 0

var number : cat61to80 = 0

var number : cat81to100 = 0

var number : catOthers = 0

var number : weight

READ(n)

WHILE (count < n) DO

READ(weight)

IF (weight >= 50 AND weight <= 60) THEN

cat50to60 = cat50to60 + 1

ELSE IF (weight > 60 AND weight <= 80) THEN

cat61to80 = cat61to80 + 1

ELSE IF (weight > 80 AND weight <= 100) THEN

cat81to100 = cat81to100 + 1

ELSE

catOthers = catOthers + 1

ENDIF

END WHILE

PRINT("There are " + cat50to60 + " students who weight is between 50 and 60.")

PRINT("There are " + cat61to80 + " students who weight is between 61 and 80.")

PRINT("There are " + cat81to100 + " students who weight is between 81 and 100.")

PRINT("There are " + catOthers + " students who weight is not between the previous categories.")

If I want to accumulate the weight of each category I have to add a counter for each category and sum the weight of each student who belong to that category.

1. Write an algorithm to determine if a number read by keyboard is prime.

var number : value

var number : divisor = 2

var bolean : prime = FALSE

READ(value)

WHILE (value > divisor AND value MOD divisor != 0) DO

divisor = divisor + 1

END WHILE

IF (value == divisor OR value == 1) THEN

prime = TRUE

END IF

PRINT("The number " + value + " prime number evaluation is " + prime)

1. Write an algorithm to print and count numbers that are multiples of 2 or 3 that are between 1 and 100.

var number : count = 1

var number : multiple = 0

WHILE (count <= 100) DO

IF (count MOD 2 == 0 OR count MOD 3 == 0) THEN

countMultiples = countMultiples +1

PRINT ("The number " + count + " is multiple of 2 or 3.")

ENDIF

END WHILE

PRINT("The number of multiples of 2 or 3 is " + countMultiples)

1. Develop an algorithm to determine if a series of numbers that the user is entering is in increasing order or not.

var number : value = 0

var number : previousValue = 0

WHILE (isThereMoreNumbers) DO

READ (value)

IF (value > previousValue) THEN

PRINT ("The serie is in increasing order")

ELSE

PRINT ("The serie is not in increasing order")

ENDIF

previousValue = value

END WHILE