COMPUTER PROGRAMMING I
-4-

BIL2205

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Algorithms – Control Structures

- Repetition Structures – Loops
- Repeat some processes.
- How many times?
  - Condition controlled loops
  - Counter controlled loops

Algorithms – Control Structures

- Loops
- Condition controlled loops
  - Repeat some steps as long as the given condition is TRUE

WHILE (condition)

    things to do while the condition is TRUE

Algorithms – Control Structures

- Loops
- Condition controlled loops

WHILE (condition)

    things to do while the condition is TRUE

1. (karnım aç) olduğu sürece

    1.1 Birşeyler atıştırayım…

2. PRINT "Oh doydum sonunda"

Algorithms – Control Structures

- Loops
- Condition controlled loops

WHILE (condition)

things to do while the condition is TRUE

1. derece 50 olsun
2. (derece > 23) olduğu sürece

   2.1 derece'nin değerini 5 eksilt.
3. PRINT derece

Algorithms – Control Structures

- Loops
- Condition controlled loops

WHILE (condition)

    things to do while the condition is TRUE

1. derece ← 50
2. WHILE (derece > 23)
    2.1 derece ← derece – 5
3. PRINT derece

Algorithms – Control Structures

Ex: Print the numbers from 1 to 10

1. START
2. sayi ← 1
3. WHILE (sayi<=10)
   3.1 PRINT sayi
   3.2 sayi ← sayi + 1
4. END.

Algorithms – Control Structures

Ex: Print the **odd** numbers from 1 to 10

1. START
2. sayi ← 1
3. WHILE (sayi<=10)
   3.1 PRINT sayi
   3.2 sayi ← sayi + 2
4. END.

Algorithms – Control Structures

Ex: Print the **even** numbers from 1 to 10

1. START
2. sayi ← 2
3. WHILE (sayi<=10)
   3.1 PRINT sayi
   3.2 sayi ← sayi + 2
4. END.

Algorithms – Control Structures

Ex: Print the **sum of** numbers from 1 to 10

1. START
2. sayi ← 1
3. toplam ← 0
4. WHILE (sayi<=10)
   4.1 toplam ← toplam + sayi
   4.2 sayi ← sayi + 1
5. PRINT toplam
6. END.

Algorithms – Control Structures

Ex: Print the **sum of** numbers from 75 to 49128

1. START
2. sayi ← 75
3. toplam ← 0
4. WHILE (sayi<= 49218)
   4.1 toplam ← toplam + sayi
   4.2 sayi ← sayi + 1
5. PRINT toplam
6. END.

Algorithms – Control Structures

Ex: Print the **sum of** numbers until user enters "0"

1. START
2. toplam ← 0
3. READ sayı
4. WHILE (sayı <> 0)
   4.1 toplam ← toplam + sayı
   4.2 READ sayı
5. PRINT toplam
6. END.

Algorithms – Control Structures

Ex: Print the **average** of 5 numbers entered

1. START
2. sayaç← 0
3. toplam ← 0
4. WHILE (sayaç<5)
   4.1 READ sayı
   4.2 sayaç ← sayaç + 1
   4.3 toplam ← toplam + sayı
5. PRINT toplam/5
6. END.

Ex: Print the **average** of 5 **positive** numbers entered

1. START
2. sayaç← 0
3. toplam ← 0
4. WHILE (sayaç<5)
   4.1 READ sayı
   4.2 IF (sayı > 0) THEN
   4.2.1 sayaç ← sayaç + 1
   4.2.2 toplam ← toplam + sayı
   ELSE PRINT "Lütfen 0'dan büyük girin"
5. PRINT toplam/5
6. END.

Ex: Print the **average** of 5 **even** numbers entered

1. START
2. sayaç ← 0
3. toplam ← 0
4. WHILE (sayaç<5)
   4.1 READ sayı
   4.2 IF (sayı % 2 = 0) THEN
   4.2.1 sayaç ← sayaç + 1
   4.2.2 toplam ← toplam + sayı
   ELSE PRINT "Lütfen çift sayı girin"
5. PRINT toplam/5
6. END.

Ex: Print the exact divisors (tam bölenleri) of 146

1. START
2. sayı ← 146
3. bölen ← 1
4. WHILE (bölen < sayı)
   4.1 IF (sayı % bölen = 0) THEN PRINT bölen
   4.2 bölen ← bölen + 1
5. END.

Algorithms – Control Structures

Exercises: Write the algorithms to:

1. Find that the number entered by the user is a prime number (asal sayı) or not.
2. Find if a number given is a perfect number or not?

Perfect number is a positive integer that is equal to the sum of its proper divisors.

Eg: 6 = 1 + 2 + 3,

Eg: 28 = 1 + 2 + 4 + 7 + 14

Algorithms – Control Structures

Exercises: Write the algorithms to:

1. Print the maximum of 50 numbers entered.
2. Print the minimum of 50 numbers entered.
3. Print the average of 50 numbers entered.
4. Find the number of odd and even numbers among 50 numbers entered.
5. Find the averages of odd and even numbers among 50 numbers entered

Algorithms – Control Structures

Exercises: Write the algorithms to:

1. Calculate the value of x! for a given x.
2. Calculate the value of x^y for given x, y.
3. Calculate the number of digits for a given integer x.
4. Calculate the value of the following series:

$$x = \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \ldots + \frac{1}{101}$$

$$\pi = \frac{4}{1} - \frac{4}{3} + \frac{4}{5} - \frac{4}{7} + \cdots$$

$$x = \frac{1}{2} - \frac{1}{3} + \frac{1}{4} - \frac{1}{5} + \cdots - \frac{1}{101}$$

Exercises

- Suppose the cover price of a book is $24.95, but bookstores get a 40% discount. Shipping costs $3 for the first copy and 75 cents for each additional copy. What is the total wholesale cost for 60 copies?
- If a worker works more than 40 hours in a week he or she is entitled to overtime pay. Overtime pay is calculated at the rate of 1.5 times the worker's hourly rate. This additional rate is only applied to hours worked above the 40 hour limit. Calculate the payment of a worker with 72 hours (hourly pay = $10)
- How many seconds are there in 3 weeks?

Exercises

1. Bir bankamatik, kendisinden istenen 570 TL'yi nasıl verir? (Sadece kağıt para kullanılarak)
2. Bir su deposuna, ilk seferinde 1 lt., sonraki seferlerde bir öncekinin 2 katı kadar su doldurulursa, 1000 lt. bir kova kaçıncı seferde taşar?
3. Her sene sonunda mevcut miktara %10 ekleyen bir banka hesabına yatırılan 1.000TL, 17 yıl sonra kaç TL olur?