Introduction to Programming

UNV102

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Introduction to Programming

Chapter 1: Computer System Hardware

Chapter 2: Computer System Software

Chapter 3: Numbering Systems and Arithmetic Operations

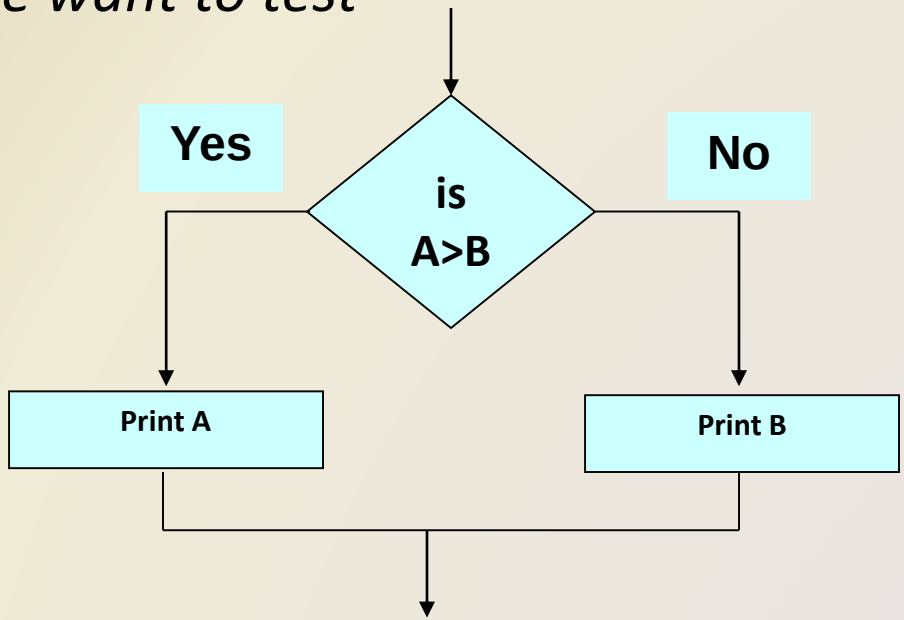
Chapter 4: Flowcharting

Chapter 5: Programming

Chapter 6: Introduction to Computer Networks

Decision structures

- The expression A>B, A<B, … is a logical expression which *describes a **condition** we want to test*



if A>B is true (if A is greater than B) *we take the action on* *left* print the value of A

if A>B is false (if A is not greater than B) *we take the action on* *right* print the value of B

Decision structures

Relational Operators

Relational Operators	
Operator	**Description**
>	Greater than
<	Less than
=	Equal to
≥	Greater than or equal to
≤	Less than or equal to
≠	Not equal to

Example 4-4

Write the pseudo-code and draw the flowchart to read a number and identify either the number is positive or negative.

Example 4-4

Pseudo-code:

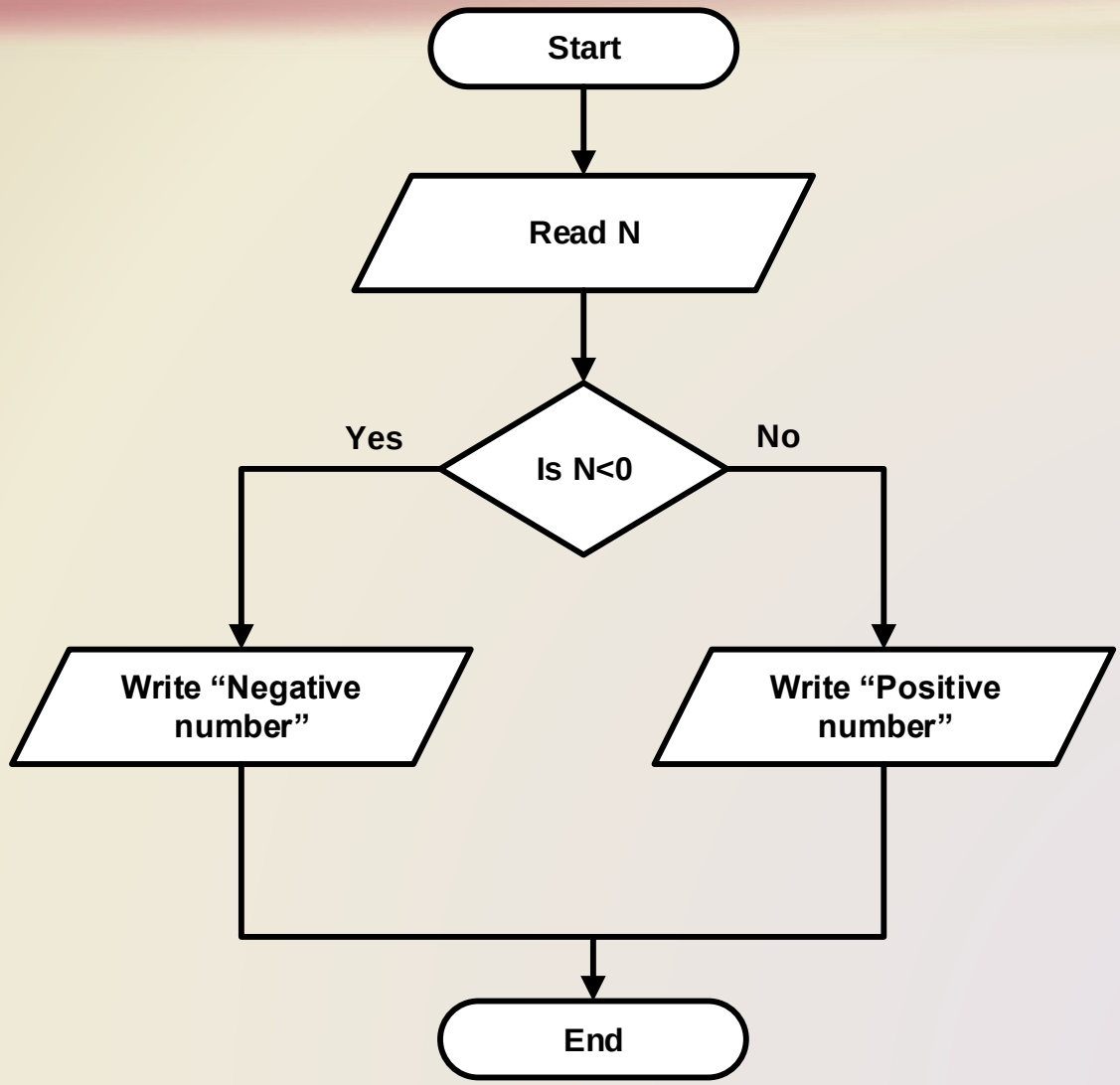
- *Input/Read a number*
- *Check the number value (greater or smaller than zero)*

  if the number greater than zero (the number is positive)

  if the number smaller than zero (the number is negative)
- *Print the number status*

Example 4-4

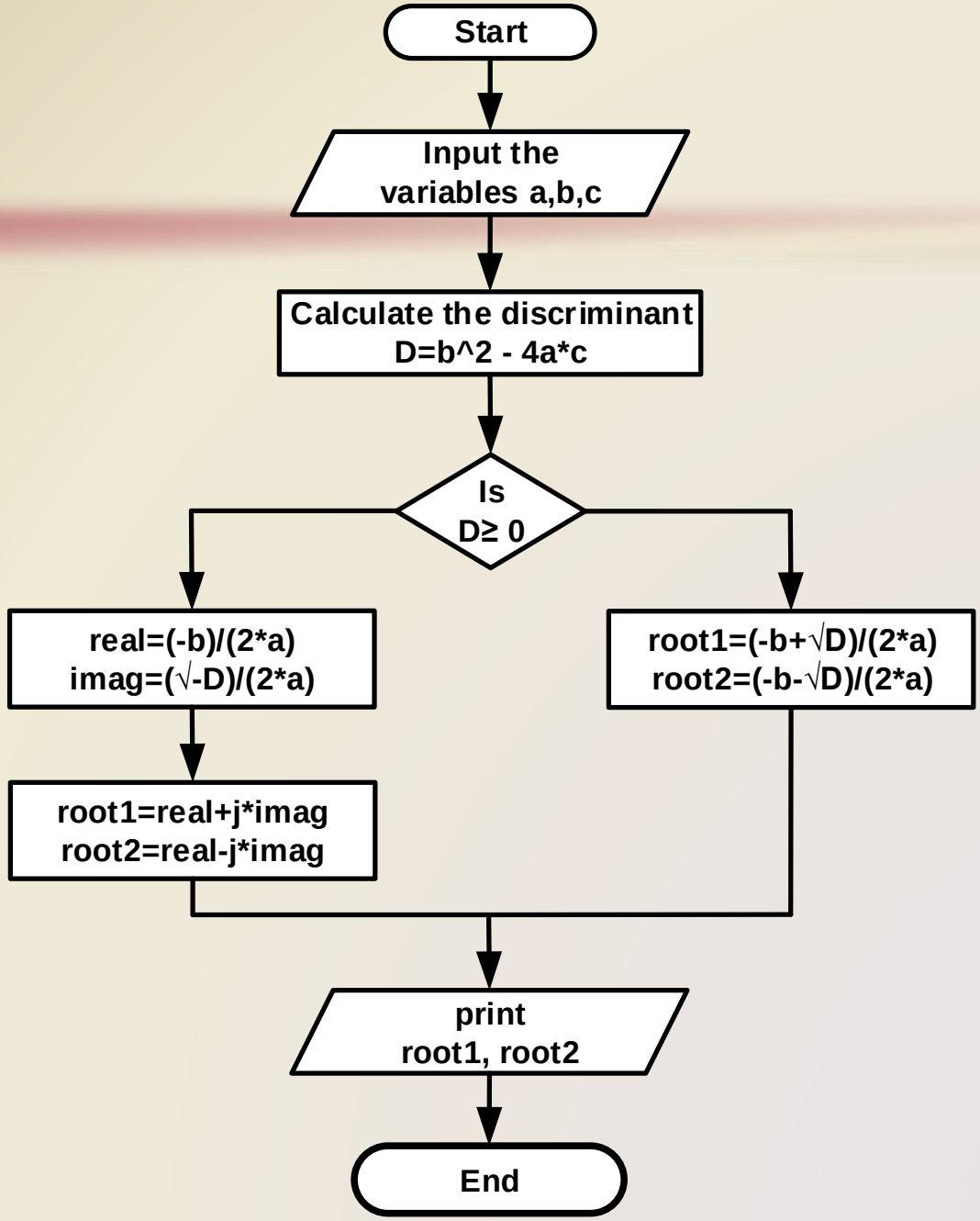
Flowchart



Example 4-5

Write the pseudo-code and draw the flowchart to find all the roots of a quadratic equation $ax^2+bx+c=0$.

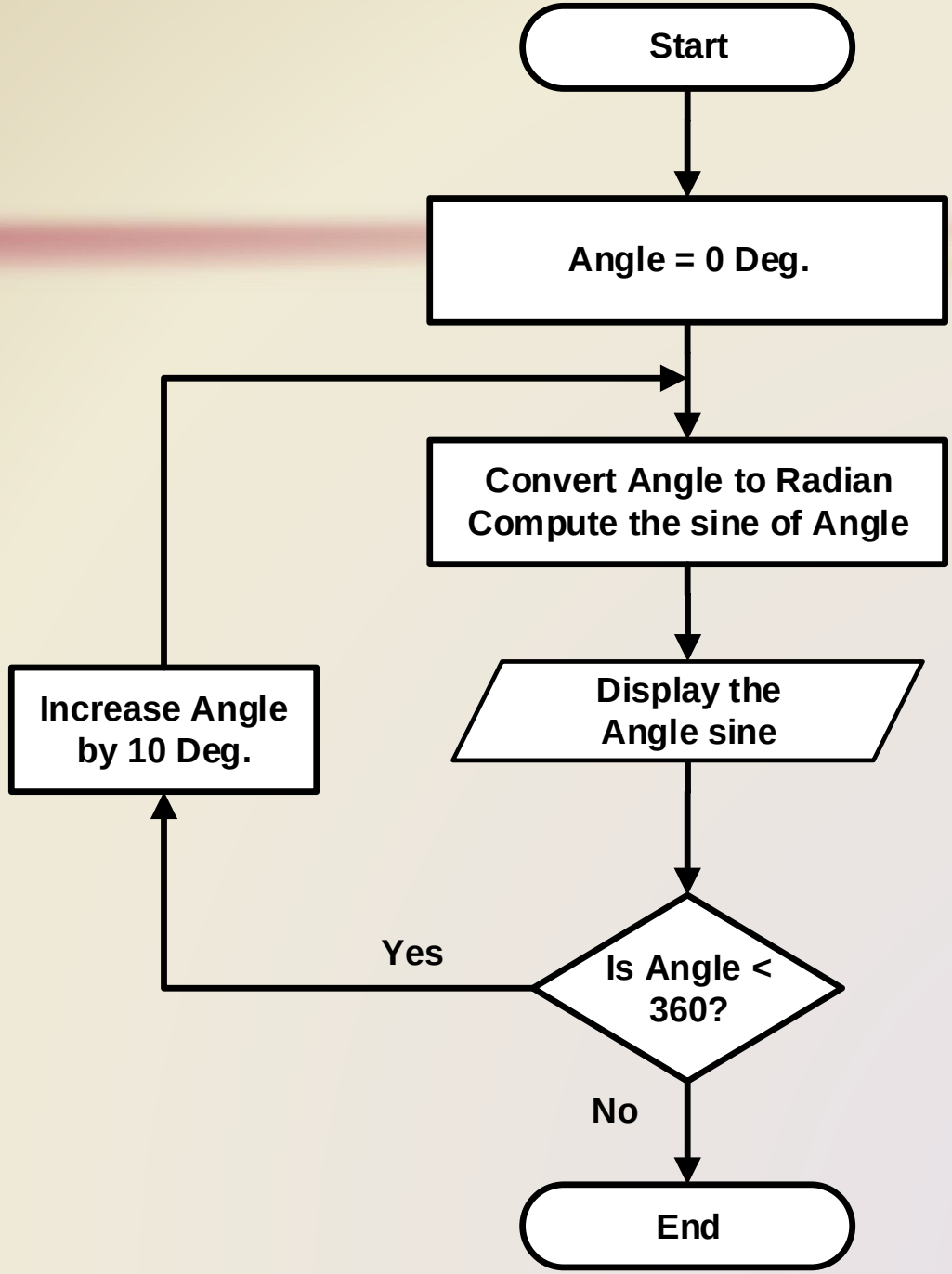
Flowchart


Start
Input the variables a,b,c
Calculate the discriminant D=b^2 - 4a*c
Is D≥ 0
real=(-b)/(2*a)
imag=(√-D)/(2*a)
root1=real+j*imag
root2=real-j*imag
root1=(-b+√D)/(2*a)
root2=(-b-√D)/(2*a)
print root1, root2
End

Example 4-6

Write the pseudo-code and draw the flowchart to obtain the sine of angles from 0 to 360^{o} with a step of 10^{o}.

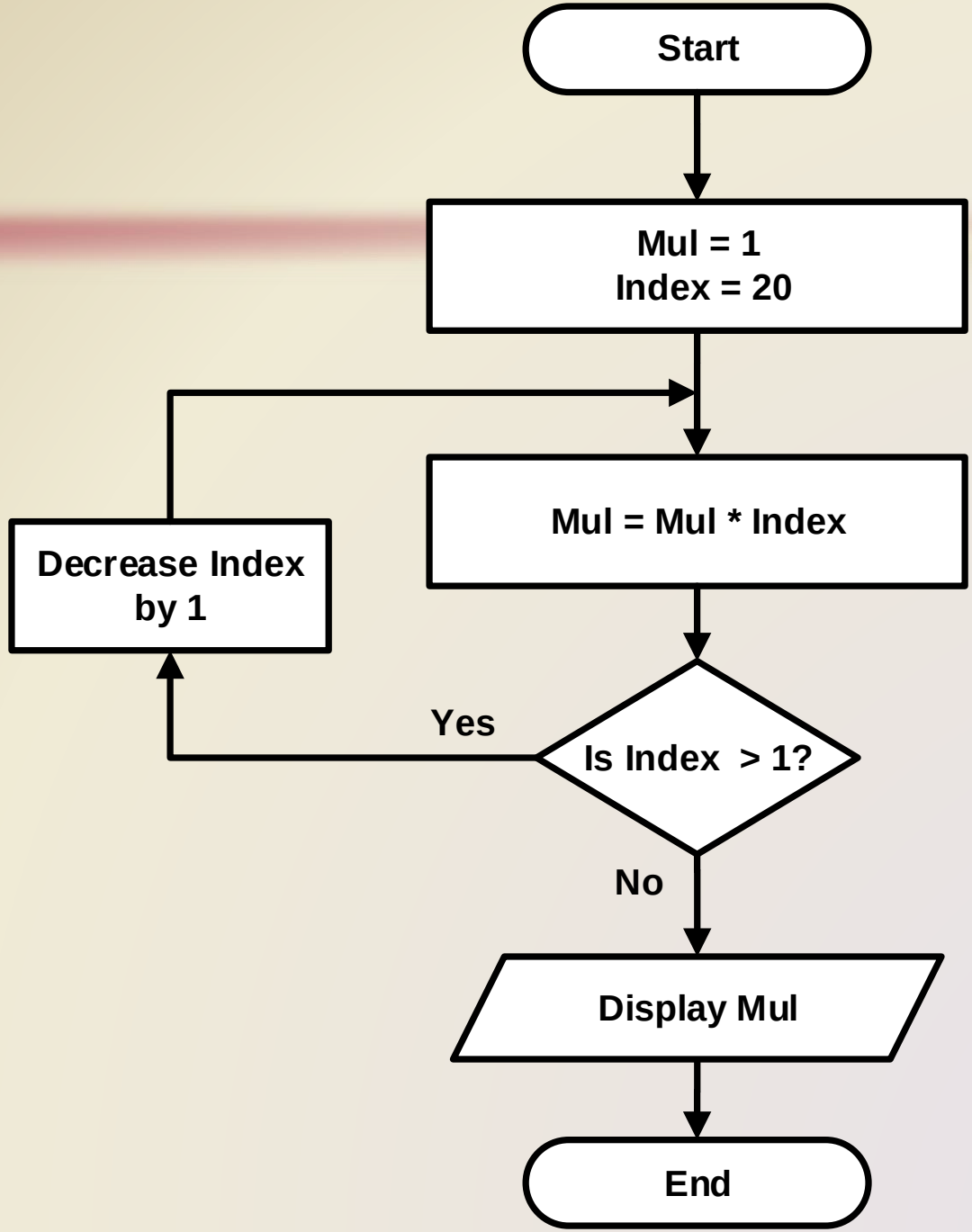
Flowchart


Start
Angle = 0 Deg.
Convert Angle to Radian
Compute the sine of Angle
Display the
Angle sine
Is Angle <
360?
Yes
No
Increase Angle
by 10 Deg.
End

Example 4-7

Write the pseudo-code and draw the flowchart to obtain the factorial of 20.

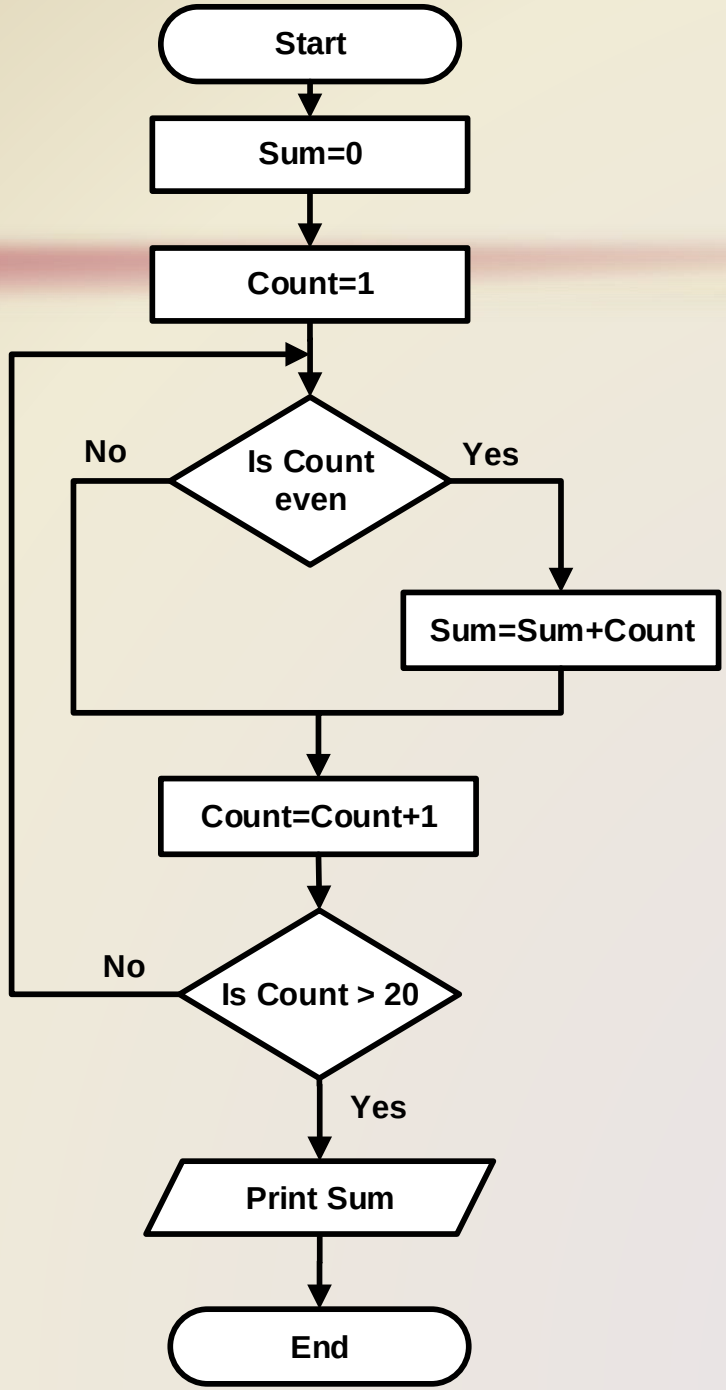
Flowchart


Start
Mul = 1
Index = 20
Mul = Mul * Index
Decrease Index by 1
Yes
Is Index > 1?
No
Display Mul
End

Example 4-8

Write the pseudo-code and draw the flowchart to add even numbers from 0 to 20

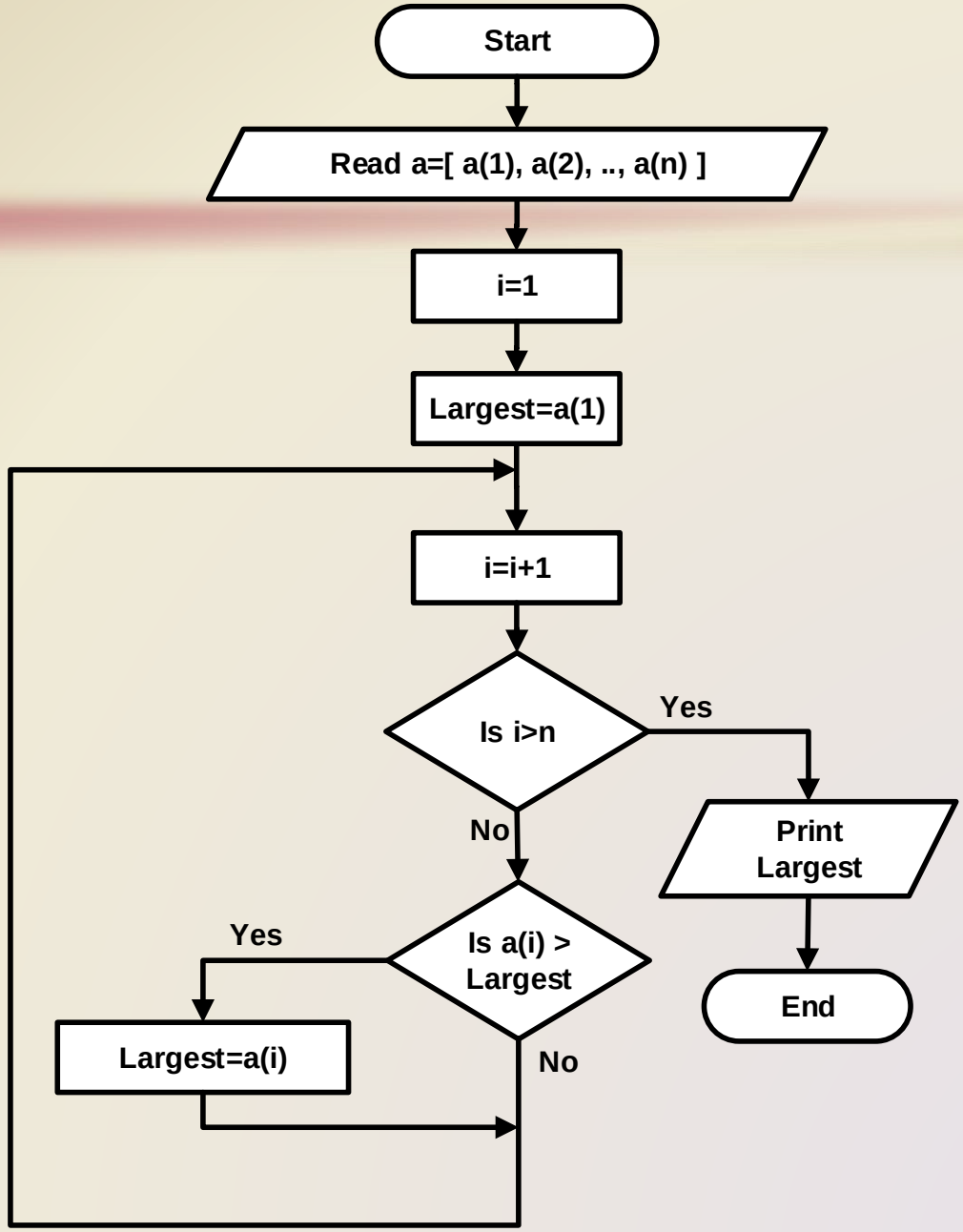
Flowchart


Start
Sum=0
Count=1
Is Count even
No
Yes
Sum=Sum+Count
Count=Count+1
Is Count > 20
No
Yes
Print Sum
End

Example 4-9

Write the pseudo-code and draw the flowchart to find the largest number in a list of numbers.

Flowchart

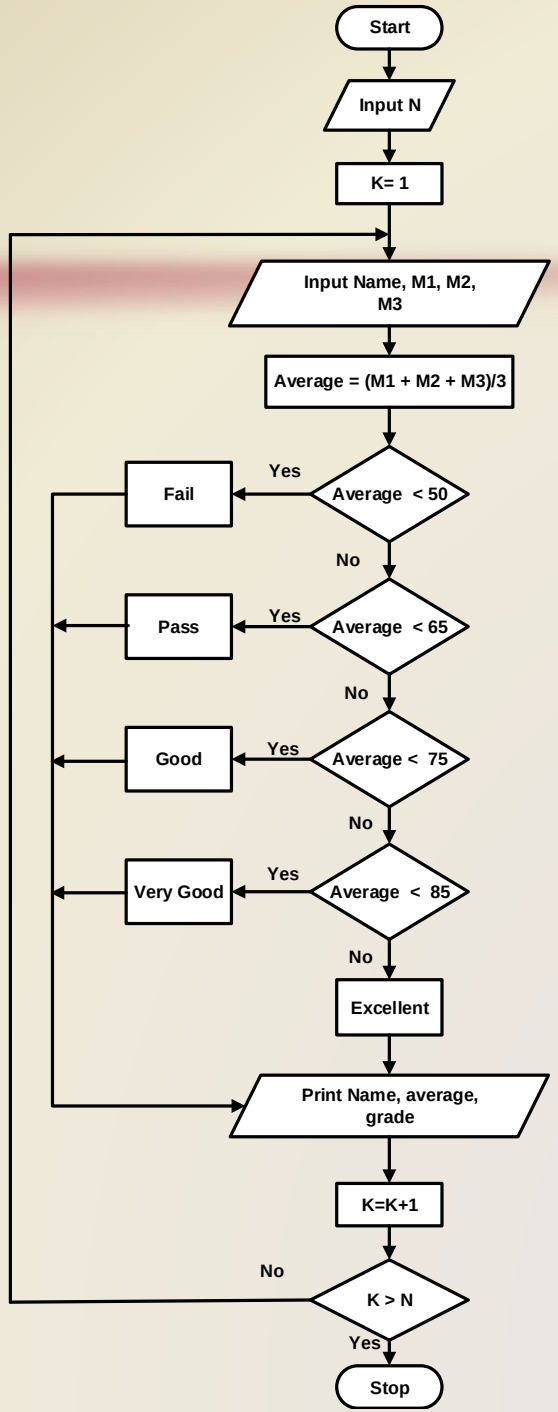

Start
Read a=[a(1), a(2), .., a(n)]
i=1
Largest=a(1)
i=i+1
Is i>n
Yes
No
Print Largest
End
Is a(i) > Largest
Yes
No
Largest=a(i)

Example 10

Write the pseudo-code and draw the flowchart to enter the name of N students and three marks for each student and print the student name, average mark, and grade.

Mark	Grade
= 85>	Excellent
85<=75>	Very Good
75<=65>	Good
65<=50>	Pass
50<	Fail

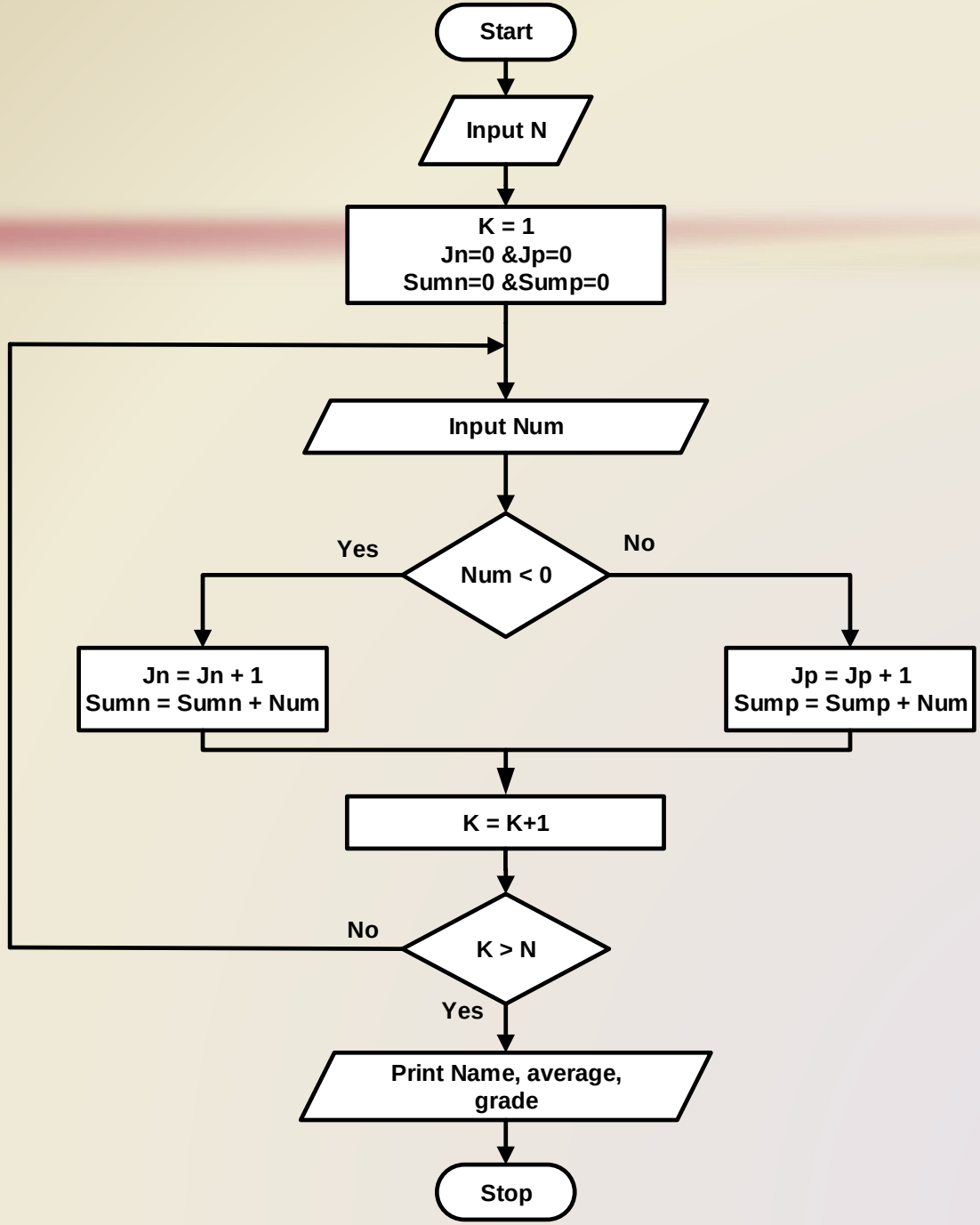
Flowchart


Start
Input N
K= 1
Input Name, M1, M2, M3
Average = (M1 + M2 + M3)/3
Average < 50
Yes
Fail
No
Average < 65
Yes
Pass
No
Average < 75
Yes
Good
No
Average < 85
Yes
Very Good
No
Excellent
Print Name, average, grade
K=K+1
K > N
No
Yes
Stop

Example 11

Write the pseudo-code and draw the flowchart to accepts N numbers and get the summation of negative, the summation of positive numbers and the number in each group.

Flowchart


Start
Input N
K = 1
Jn=0 &Jp=0
Sumn=0 &Sump=0
Input Num
Num < 0
Yes
No
Jn = Jn + 1
Sumn = Sumn + Num
Jp = Jp + 1
Sump = Sump + Num
K = K+1
K > N
No
Yes
Print Name, average, grade
Stop