Programming in QBasic

Of all of high level languages, BASIC (Beginners All purpose Symbolic Instruction Code) is probably the easiest to learn. The beginning user soon discovers that small programs can be written and quickly entered into the computer, producing interesting results. The goal of our study is to learn how to write computer programs in QBASIC Language.

QBASIC language Contents

The following Contains are used by QBASIC System:

1. Letters of the alphabet(A,B,C,……….Z).
2. Digit Numbers (0,1,2………………..9).
3. Characters and Symbols(+,-,*, /, =,^, ( ),<,> , >=,=< ,<>,@,#,!,?,",%   ).
4. Special Words (go to, if , read, print, input).

Constants In QBASIC

Constants In QBASIC division into two types:

1. *Numeric Constants*: there are two types of numeric constants:

- *Real:* the numbers used may be written in decimal form such as(6.9,-52.76,0.095, -3269.0)
- *Integer:* Whole numbers may be written without the decimal point such as (89,-132,7698)
- *Exponential Form:* this form requires a number fallowed by the letter E, such as (2.8E05,0.57E-03,0.07E-9, and 29.8E7).

String Constants. a string consists of a sequence of characters enclosed in double quote marks. strings usually consist of names or address or cities such as "Computer", "Baghdad".

Variables In QBASIC

Again Variables in QBASIC division into two types:

1. *Numeric Variables:* the variables used to represent numbers are the letters of the alphabet .these may followed by a digit or letter. including 0 .for example: (A,b,c…..,A0,b1,c2,Ab,ba,bv,zx).

2. *String Variables:* a string variables must consists of a letter of the alphabet followed by the $ character, such as (A$,BC$,A2$,ZW$).

Arithmetic Expressions

Expressions are used in QBASIC in order to perform calculations. in general ,an expression may consist of a single constant or a single variables, or of arithmetic operation involving two or more constants or two or more variables ,or of any arithmetic combination of constants and variables. Although complicated mathematical expressions will not occur frequently, some skill is required to translate mathematical expressions into QBASIC expressions. in performing this task ,it is necessary to know that the QBASIC compiler using the following order of precedence in performing arithmetic operations:

Order	Symbol	Remark
first	( )	Operations within parentheses are performed first.
second	^	Exponentiation is performed before other arithmetic operations.
third	*, /	Multiplication and division are equal in order of precedence.
forth	+ , -	Addition and subtraction are performed last and are equal in order of precedence.

Example-1

Suppose(a=5. b=4 ,c=2 ,i=2,j=1) Execute the following expressions in order of precedence:

? a + b + c / 12
?(a + b+ c) / 12
? a + b / c – I * j + a ^ 2
? a * b – c / I + j + a ^ b + c ^ 3
? a * j ^ b – I / c * j + 20
? j / (I + c)
? j / I +c
? (a * (b + I) * c) ^ 2
? (j + I * (b / c – a ^ 2)) + i
? (I + j) / a
? I + j / a
? (j * (a ^ 2 – 10)) / 2
? i + j ^ 2 – 3 * a
? ((I + j) / 3 * a) ^ 2 / 2

Example-2

Write following expressions in appropriate formula in QBASIC language:

$Y=a.b - r.s + r^2$ →Y=A*b-R*S+R^2

$P=(x+y)(x-y)/x^2$ →P=(X+Y)*(X-Y)/X^2

$Y=x^2-2x-4$ → Y=X^2-2*X-4

$Y=x+\dfrac{r^2}{c.b} + s.r - b$ →Y=X+r^2/(C*B)+S*R-B

$T=t(1-d).y-t.(1-d)y$ →T=t*(1-d)*Y-t*(1-d)*Y

$A=s.r-y.z+x/5$ →A=S*R-Y*Z+X/5

$A=\dfrac{s.r-y.z+x}{5}$ →A=(S*R-Y*Z+X)/5

$A=s+r^2-\dfrac{sr}{s} + 7$ →A=S+R^2-S*R/S+7

3

$A = s + r^2 - \dfrac{s.r}{S+7}$ $\rightarrow$ A=S+R^2-S*R/(S+7)

$A = (s(x-2))(s^2-1)$ $\rightarrow$ A=(S*(X-2))*(S^2-1)

$A = \dfrac{PQ}{CB}$ $\rightarrow$ A=P*Q/(C*B)

$A = \dfrac{PQ}{C} \cdot B$ $\rightarrow$ A=P*Q/C*b

$A = (d-r)^2/(d+r)$ $\rightarrow$ A=(d-r)^2/(d+r)

$P = a + \dfrac{bs-d}{J}$ $\rightarrow$ P=A+B*S/J-d

$P = a + \dfrac{b.s}{j-d}$ $\rightarrow$ P=A+B*S/(J-D)

$Q = i^2 - ba - \dfrac{a}{I}$ $\rightarrow$ Q=i^2-B*A-A/i

$Q = I^2 - \dfrac{B.A-A}{I}$ $\rightarrow$ Q=I^2-B*A/I -A

$AS = b/(j-a)$ $\rightarrow$ AS=B/(J-A)

$AS = \dfrac{B}{J} - A$ $\rightarrow$ AS=B/J-A

$R = \dfrac{(s+b)(a+d)}{B}$ $\rightarrow$ R=(S+B)*(A+D)/B

$R = (S+B).\dfrac{(A+D)}{B}$ $\rightarrow$ R=(S+B)*((A+D))/B

$T = \dfrac{(a+b)}{M} \cdot S$ $\rightarrow$ T=(A+B)/M*S

$T = \dfrac{(A+B)}{M*S}$ $\rightarrow$ T= (A+B)/(M*S)

Library Functions

Each basic interpreter has within it the capability of calculating certain special functions, some times called library functions. these functions are indicated by three letters naming the function, fallowed by argument enclosed in parentheses. the argument may be either a number, a variable, or a an expression. in the following table library functions as might be found in most basic interpreters.

Function	Description of function
ABS(x)	Absolute value of x , $\lvert x \rvert$.
SGN(x)	=(-1 or 0 or 1) for (x<0 or x=0 or x>0).
SQR(x)	Square root of x.
INT(x)	The largest integer not exceeding x.
RND(x)	Create random number value between 0 and 1.
Sin(x)	Sin of x, x in radians
Cos(x)	Cosine of x, x in radians
Tan(x)	Tangent of x, x in radians
Atn(x)	Arctangent of x, x in radians
Exp(x)	The value of e^x
Log(x)	The natural logarithm of x ,ln(x)
Mod	Modulus-Rest of division. Ex:10mod3=1
Div	Integer division. Ex:10div3=3

Example

convert following mathematical expressions in appropriate formula QBASIC language:

$S=\sin(x)^2+\cos^3(x)$ $\rightarrow$ S=sin((x*3.14/180)^2)+cos(x*3.14/180)^3

$D=\log(x)-\log x^2$ $\rightarrow$ D=log(x)/log(10)=log(x^2)/log(10)

$R=\dfrac{\lvert d\text{-}s \rvert}{n}$ $\rightarrow$ R=abs(d-s)/n

$Y=\dfrac{1\text{-}e^x}{1+e^x}$ $\rightarrow$ Y=(i-exp(x))/(1+exp(x))

$Y=s\sqrt{s}+4$ $\rightarrow$ Y=s*sqr(s)+4

$Y=\log b-\sin x+dr$ $\rightarrow$ Y=log(b)/log(10)-sin(x*3.14/180)=d*r

$P=\dfrac{\lvert x\text{-}y \rvert .c\text{-}3(y\text{-}x)(z\text{-}r)}{r+1}$ $\rightarrow$ P=abs(x-y)*c-3*(y-x)*(z-r)/(r+1)

$B=\ln x +b\ln y+b \ln x^2$ $\rightarrow$ B=log(x)+b*log(y)+b*log(x^2)

$D=\log x-b$ $\rightarrow$ D=log(x)/log(10)-b

$V=\log m-\log k$ $\rightarrow$ V=log(m)/log(10)-log(k)/log(10)

$Y=Cos(x)/2-Sin^2(x)$ $\rightarrow Y=cos(x*3.14/180)/2-sin(x*3.14/180)^\wedge 2$

$A=\dfrac{Sin(x).Cos(x)}{Cos^2(x)}$ $\rightarrow A=sin(x*3.14/180)*cos(x*3.14/180)/cos(x*3.14/180)^\wedge 2$

$Z=\dfrac{|3m-1|}{\sqrt{n+1}}$ $\rightarrow Z=abs(3*m-1)/sqr(n+1)$

$Z=\dfrac{|3m-1|}{\sqrt{n}}+1$ $\rightarrow Z=abs(3*m-1)/sqr(n)+1$

$B=tanx-x.Sec(x).Cos(x)$ $\rightarrow B=tan(x*3.14/180)-x*1/sin(x*3.14/180)*cos(x*3.14/180)$

$W=3.e^x.\sqrt{1+e^x}$ $\rightarrow w=3*exp(x)*sqr(1+exp(x))$

$C=\dfrac{e^{x/a}+e^{-x/a}}{e^{x/a}-e^{-x/a}}$ $\rightarrow C=(exp(x/a)+exp(x/a))/(exp(x/a)-exp(x/a))$
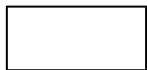
Flow Charts

Flow charts are drawing diagrams illustrates series steps must the program follows to Result the outputs. following the figures used in flow charts:
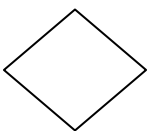
The start and end of program symbol
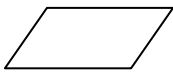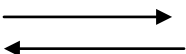
Input and output symbol

Arithmetic operation symbol

Decision symbol

Reparative symbol

Link symbol

Direction traffic

6

The QBasic language statement:

The general form of the REMARK statement is:

REM[remark]

Where remark may be any remark the programmer chooses to make to describe the program, to identify various parts of program, or even to serve as a blank line between parts of the program. for example:

REM this program is named calculate
Rem program written in 2010-03-30
Rem input modul
Rem output modul

Print Statement

The general form of the Print statement is:

Print expression (, or ;) expression etc.

Where expression is any number, any string of words, any variable, or any combination of numbers and variables in an algebraic expression. commas or semicolons must be used to separate expressions. For example:

Print
Print X
Print a,b,c
Print s;t;u;r;v
Print "the sum is";s9
Print a$,B$,c$

Remark : the symbol " " use in print statement for print strings.

Input Instructions

There are three types of input instructions include:
1. Let statement.
2. Input statement.
3. Read / Data statement.

Let statement.

The general form of the Let statement is:

Let variable = expression

Where variable may be either a numeric variable or a string variable and expression may be either an arithmetic expression or a string expression. strings cannot be placed into numeric variables, or vice versa. The following are examples of let statement:

Let X=25
Let A$="computer"
Let R3=5*x*(X-9)
Let M$=N$

Example-1

Write a program to compute the following functions:

$A=X^2+Y^2$

$B=A^2+XY$

$C=(A+B)^2$

Solution

Let x=5

Let y=7

A=X^2+Y^2

B=A^2+X*Y

C=(A+B)^2

Print a,b,c

Example-2

Write a program to compute the area and circumference of triangle it sides x=4,y=3,z=5.

Solution

REM Program for compute triangle area and circumference

x=3:y=4:z=5

C=x+y+z

S=C/2

Ar=sqr(s*(s-x)*(s-y)*(s-z))

Print "the circumference is";C

Print "the area is";AR

start

x=3,y=4,z=5

C=x+y+z
S=C/2
Ar=sqr(s*(s-x)*(s-y)*(s-z))

Print C,Ar

end
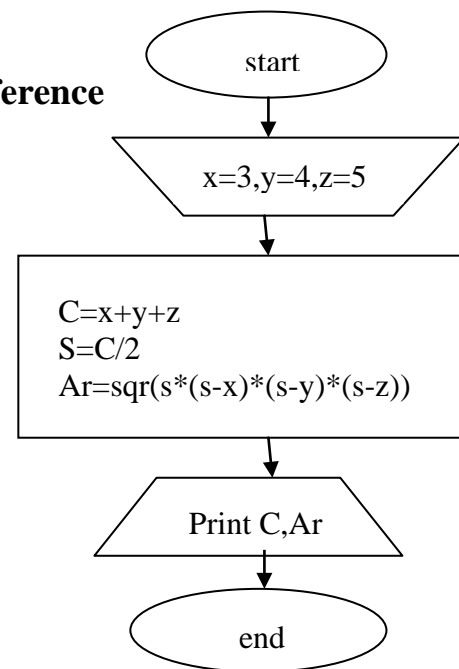
Example-3

Write a program to find horizontal component and vertical component and for force =70N slope $45°$From x-axis.

Solution

Rem program to force components

F=70

Th=45*3.141592/180

Fx=F*cos(th)

Fy=F*sin(th)

?Fx,Fy

8

Input statement

The general form of the input statement is

Input variable [,variable…]

Where variable stands for any suitable variable chosen by the programmer. Also it is the programmers option to use more than one variable ,separating them by commas, in order to enter additional values. When the program is running and control comes to an input statement, the computer print question mark (?) and pauses so that the user may enter the proper value for that variable. This opportunity to enter a value makes the program very flexible. The following are examples of Input statement:

Input X
Input A, B, C
Input A\$, R\$
Input M\$,E\$,F\$,N

Example-1

Write a program to compute the real roots of a equation $AX^2+BX+C=0$

Solution

REM Program for compute roots of equation
Input A,B,C
X1=(-b+ SQR(b^2-4*a*c)) /(2*a)
X2=(-b-SQR (b^2-4*a*c)) /(2*a)
Print" the first root is";X1
Print " the second root is";X2

Example-2

Write a program to compute the area and circumference of circle its radius R.

Solution

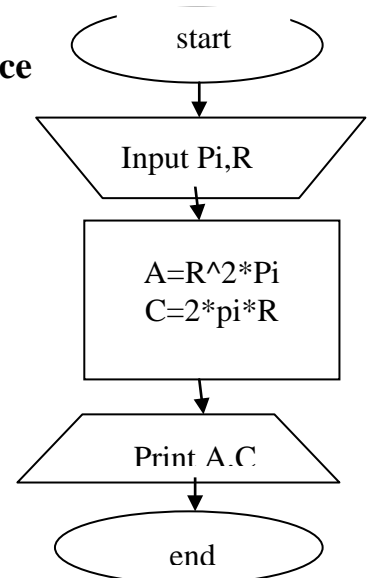**REM Program for compute circle area and circumference**
Pi = 3.141592
Input "radius of circleis";R
A=R^2*Pi
C= 2*pi*r
Print" the area is";A
Print"the circumference is";C

9

Example-3

Write a program to input the length ,width, and high of wall then compute the number of bricks in wall ,if you know the brick sides is (24x8x12cm).

Solution

> **REM Program for compute bricks number**
> **Input "the wall length";L**
> **Input "the wall width";W**
> **Input "the wall high"; H**
> **V=L*W*H**
> **N=V/(24x8x12)**
> **?"bricks number is"N**

Read / Data statement.

The general form of the Read and Data statements are:

> **Read variable [,variable] etc.**
> **Data datum   [,datum] etc.**

Where variable is any valid numeric variable or string variable and datum is any valid number or string constant. The following are examples of Read / Data statements:

Read X,Y,Z
Data 12.7,35,-29.75

Read A,N$,M$,T
Data 7.4, "address","telephone",66.7

Example-1

Write a program to read student name and 6 degree then compute and print the average of student degree.

Solution

> **Read A$,a,b,,c,d,e,f**
> **S=a+b+c+d+e+f**
> **AV=S/6**
> **Print A$,AV**
> **Data Ali,50,65,87,97,90,70**

Example-2

Write a program to read 4 variables then compute arithmetic mean and geometric mean.

Solution

> **Read x1,x2,x3,x4**
> **Ar= (x1+x2+x3+x4)/4**
> **Ge=(x1*x2*x3*x4)^(1/4)**
> **Print "arithmetic mean is";ar**
> **Print "geometric mean is";ge**
> **Data 50,67,80,77**

10
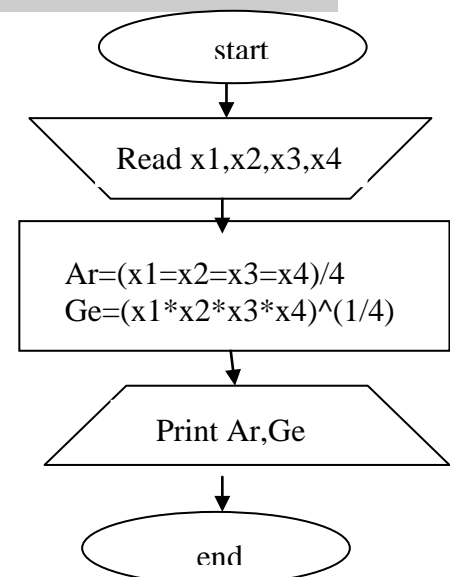
The general form of the restore statement is

Restore

Whenever control executes the restore statement, the system restores the data block pointer to the first item of data. then the next read statement starts the process of reading the data all over again from the very first data statement.

Example

Read a,b,c
Restore
Read x,y,z
Data 5,7,9

The x,y,z have the values5,7,9

Control Statements

Control statements include

1. *Go To statement*
2. *If Then statement*
3. *If Go To statement*
4. *On Go To statement*

1.The Go To Statement

The general form of the Go To statement is:

Go To Line number

Where line number represents the next line number to which control will go instead of the following line number. the following are examples of the go to statement: Go to 10, Go to 5.this statement is sometimes called the unconditional go to statement.

Example-1

Write a program to compute the average of 6 subjects for number of students.

Solution

10 Input N\$,S1,S2,S3,S4,S5,S6
AV=(S1+S2+S3+S4+S5+S6)/6
Print N\$.AV
Go To 10

start

Input N\$,S1,S2,S3,S4,S5,S6

AV=(S1+S2+S3=S4+S5+S6)/6

Print N\$,AV

end
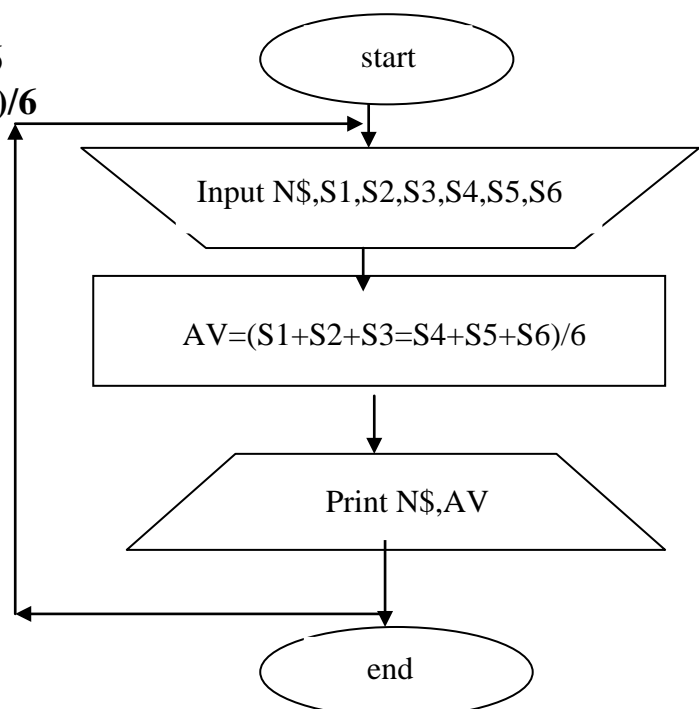
2.The IF … THEN Statement

The general form of the If … then Statement is:

IF Condition THEN Line Number

Where condition has the form :

Arithmetic expression   **relation**   **Arithmetic expression**

  Or

String expression   **relation**   **String expression**

And relation represents one of the symbols from the following table:

Symbol	Example
=	A=B
<	A<B
>	A>B
<=	A<=B
>=	A>=B
< >	A< >B

Example-1

Write a program to compute the Summation (S) of values from 1 to 100 where:
S = 1+2+3+…………100.

Solution

```
        S=0 : I=1
   5    S=S+I
        I=I+1
        If  I <= 100 then 5
        Print S
```

Example-2

Write a program to compute the summation for even numbers from 0 to N.

Solution

```
        Input N
        S=0 : I=0
   5    S=S+I
        I=I+2
        If  I < N then 5
        Print S
```

Example-3

Write a program to compute Y value where:

Y=A+B   if A<= B

Y=A*B   if A > B

Solution

```
        Input A,B
        If A> B then Y= A*B
        If A<= B then Y=A+B
        Print Y
```


12
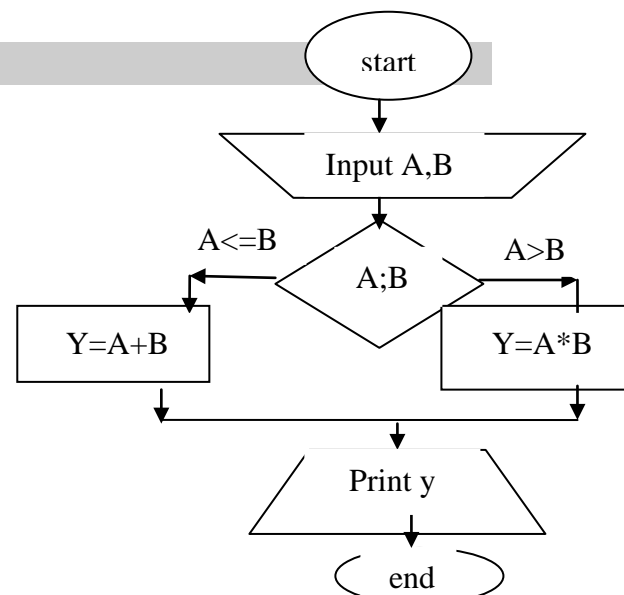
Example-4

Write a program to compute Summation of X values from list of 10 different numbers.

Solution

```
        I=1
    5   Read X
        S=S+X
        I=I+1
        If I<= 10 then 5
        Print "sum=";S
        Data 5,12,15,18,20,30,7,5,57,75
```

Example-5

Write a program to compute S value where :S=1-1/3+1/5-1/7+………….1/n.

Solution

```
        Input N
        I=1
        J=1
    5   T=1/I
        S=S+T*j
        I=I+2
        J=-J
        If I <=N then 5
        Print S
```

Example-6

Write a program to compute the summation of following series (use 20 terms)
S=-3/5+7/10-11/15+15/20-……………….

Solution

```
        N=1: K=-1: i=3: j=5
    5   T=i/j
        S = S + T*k
        N=n+1: k=-k: i=i+4: j=j+5
        If n<=20 then 5
        Print S
```

Example-7

Write a program to input any number then determine if the number is odd or even.

Solution

Input X
If (x/2)= int(x/2) then print "x is even"
If (x/2) < > int(x/2) then Print "x is odd"
Or
Input X
If x mod 2 =0 then print "x is even"
If x mod 2 < > 0 then print "x is odd"

13

Example-8

Write a program input any number then determine if the number is integer or not.

Solution

Input X
If x= int(x) then print "x is integer"
If x<> int(x) then Print "x is not integer"

Example-9

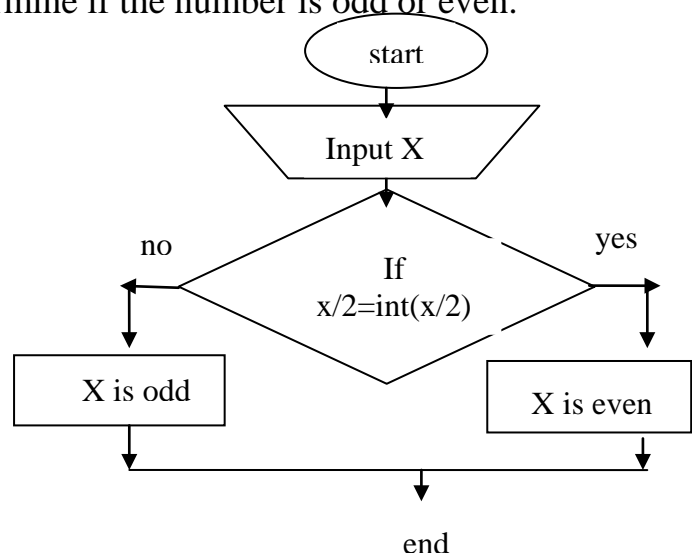Write a program to compute the result of following series ,if you know the program stop when the term value less than 10^{-4}

$Y= 1 - X^3 + 5 X^7 - 9 X^{11} + \text{-------------}$ if $X \geq 0$

$Y= X^2 + 3 X^6 + 5 X^{10} + 7 X^{14} + \text{--------}$ if $X < 0$

Solution

```
        Read X
        If X < 0 then  20
        I  =1 : K = -1 : Y = 1
10      T = K *I * X ^ (I + 2)
        If abs (T) >10^-4 then
        Y = Y+T
        I=I+4
        K = - K
        Go to 10
        If X < 0 then
        I= 1
20      T= I *X^ (2*I)
        If abs(T) > 10^-4 then
        Y = Y+T
        I =I+2
        Go to 20
        Print Y
        Data 1
```

Example-10

Write a program ask about point axis and circle radius ,it is center the original point, then compute if the point is inside, or on or outside the circle.

Solution

Input x,y ,r,m1,m2
D= sqr((x-m1)^2+(y-m2)^2)
If d<r then print "Point inside the circle"
If d>r then print"Point outside the circle"
If d=r then print"Point on the circle"

Example-11

write a program that read 5 forces in point with angle to x- axis, then compute the resultant of these forces in x and y axis if you know that $R = \sqrt{Rx^2 + Ry^2}$

Solution

```
    I =1
10  Read F,th
    Rx=F * Cos(th*3.14/180)
    Ry=F * Sin(th*3.14/180)
    S₁= S₁+Rx
    S₂= S₂+Ry
    I=I+1
    If I<=5 then  10
    R= SQR(S₁^2+S₂^2)
    PrintS1,S2,R
    Data 50,30,70,45,60,90,80,180,50,270
```

Example-12

(12) concrete cub be tested (cubic side 150x150x150) by reign power(P) on cubic .write a program for read P values then compute and print number of successful model and it is percentage ,if you know the cubic be successful in test if the stress equal or more than 20N/mm^2, and the stress equal the power divided by cub area.

Solution

```
      I = 1
10    Read P
      F = P / (150 * 150)
      If F > 20 then X = X+1
      Y = Y + 1
      I = I + 1
      If I <= 12 then 10
      N= X / 12 *100
      Print " successful model is"; X
      Print " the percentage is "; N
      Data
```

Example-13

for compute stress (Fc) of concrete cub it is side X , reign Power to cubic surface it is value (P), write a program to compute and print the average for stress when reign different value of powers (100,150,200,……..,500),if you know Fc=P/A.

Solution

```
        Read X
        A = X*X
        S=0
        P=100
  10    Fc = P / A
        S = S + Fc
        I= I + 1
        P = P + 50
        If  P < = 500 then 10
        AV = S / I
        Print " the average is"; AV
        Data 10
```

Example-14

Write a program to compute A value: $\sqrt{A} = \sum_{x=1}^{x=10} \left| \dfrac{X^2 - 3X}{X + \cos^3 X} \right|$

Solution

```
        X=1
  10    S=S+abs((X^2-3*X)/(X+cos(x*3.14/180)^3)))
        X=X+1
        If X<=10 then 10
        A=S^2
        ? A
```

3.The IF … Go To Statement

The general form of the If … go to Statement is:

IF Condition Go To Line Number

Example-1

Write a program to compute the average of 50 students have 6 subjects.

Solution

```
         REM this program for compute the average
        I=0
  10    Input N$,S1,S2,S3,S4,S5,S6
        AV=(S1+S2+S3+S4+S5+S6)/6
        Print N$,AV
        I=I+1
        If I < 50 go to 10
        End
```

Example-2

Write a program to compute the (N!) value.

where N!=1*2*3….N

Solution

```
        REM this program for compute the factorial
         Input N
         I=1
         F=1
  5      F=F*I
         I=I+1
         If I<=n go to 5
         Print F
```
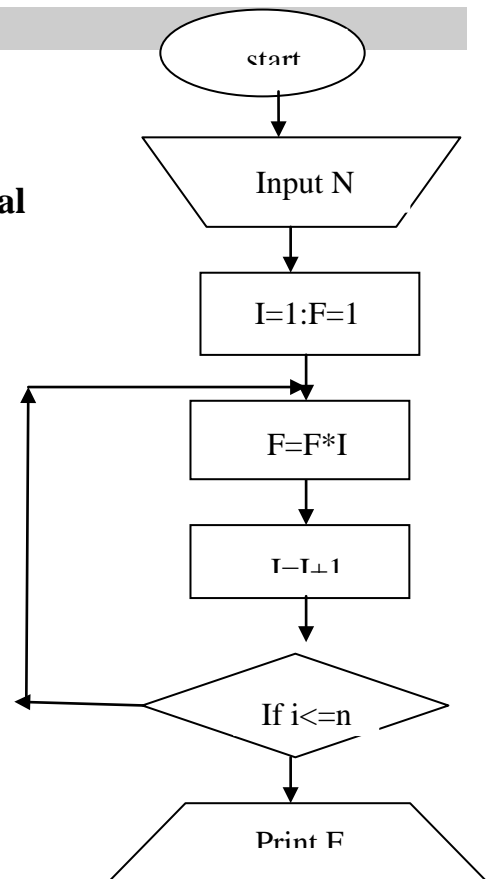

Example-3

Write a program to compute the sum and count of positive and negative numbers from list of (30) number.

Solution

```
        K=0: j=0
  5     Read A
        If A > 0 go to 10
        SN=SN+A
        J=j+1
        Go to 20
  10    SP=SP+A
        K=k+1
  20    If j+k < 30 go to 5
        Print "Positive numbers" ;SP,k
        Print "negative number" ;SN, j
        Data 30,60,-70,,9,-5,………………
```

17

Example-4

Write a program to compute the sum and count of odd and even and summation of all values from list of (N) numbers.

Solution

```
     J=0 : k=0 : SE=0 : SO=0 : SX=0
     Read N
5    Read X
     Y=X/2
     If Y=INT(Y) go to 10
     SO = SO + X
     J=j+1
     Go to 20
10   SE = SE + X
     K =k +1
20   SX=SX+X
     If k+j < N go to 5
     Print " sum of odd number is ";SO, "count of odd number is"; j
     Print " sum of even number is ";SE, "count of even number is"; k
     Print "sum of all numbers is "; SX
     Data 10, 12,6,9,7,8,5,56,77,3,99
```

Example-5

Write a program to compute Y value from the following series, use 15 terms only.

$$\frac{Y^2}{\pi} = \frac{X^3 + 30}{2!} - \frac{X^5 + 29}{4!} + \frac{X^7 + 28}{6!} - \frac{X^9 + 27}{8!} + \dots\dots\dots\dots$$

Solution

```
    Read X
    p = 3.14
    I = 2: j = 30: l = 1: n = 1
5   f = 1
    k = 1
10 f = f * k
    k = k + 1
    If k <= i   Go To 10
    t = ((x ^ (i + 1) + j) / f) * l
    s = s + t
    i = i + 2
    j = j - 1
    l = - l
    n = n + 1
    If n < = 15 Go To 5
    Y= SQR (3.14*S)
    Print Y
    Data 1
```

Example-6

Write a program to compute S value from following series, use 20 terms.

$$S = 1 - \frac{2*1}{3} + \frac{5*3}{7} - \frac{8*7}{11} + \frac{11*15}{15} - \ldots\ldots\ldots\ldots$$

Solution

```
        N=1
        S=1
        L=-1
        I=2 : J=3 : K=1
    10  T= (I * K) / J
        S=S+T
        I= i+3
        J=j+4
        K= 2*k+1
        L=-L
        N=N+1
        If N <= 20 go to 10
        ? S
```

Example-7

Write a program to find y value from the equation $y=X^2-4X+6$ for X value from 0-10.

Solution

```
        X=0
    5   Y= X^2-4*X+6
        ?"X=";X,"Y=";Y
        X=X+1
        If X<=10 go to 5
```

Example-8

Write a program to compute reaction of steel cable (R) to temperature (T) that equal (293,313,333,353) using the following equation:

$$R = 8.85 * 10^{-8}[1 + 6.5 * 10^{-3}(T - 237)]$$

Solution

```
        T=293
    10  R=8.85E-8(1+6.5E-3*(T-273))
        PRINT R
        T=T+20
        If T<= 353 go to 10
```

Compound IF … then

The general form of compound if ...then is:

Simple relation (and, or) simple relation

The most logical operators are in following table:

Logical operators	Remark
X1 and X2	True if x1 and x2 are true other wise false.
X1 or X2	True if either x1 or x2 or both true otherwise false.

Example-1

Write a program to compute the Y value where:

$X = (A+B) / 2$

$Y = X^2 + X - 3$ if A=1 or B=3

$Y = X^2 + 3X + 5$ if A >2 and B > 4

$Y = X^3 + 2X^2 + X$ otherwise

Execute the program to N from A,B values.

Solution

```
        Print " A     B    X     Y": print "------------------"
        Read N
        I=1
5       Read A,B
        X=(A+B)/2
        If A=1 or B=3 go to 10
        If A>2 and B>4 go to 20
        Y=X^3+2*X^2+X
        Go to 30
10      Y= X^2 +X-3
        Go to 30
20      Y=X^2+3*X+5
        print A;"     ";B;"    ";X;"      ";Y
30      I=I+1
        If I<=N go to 5
       Data 5,1,3,2,4,3,5,1,2,5,4
```

Example-2

Write a program to input 3 numbers then find the maximum one.

Solution

```
        Input a,b,c
        Max=a
        If b>a and b>c then max=b
        If c>a and c>b then max =c
        Print "the maximum is";max
```

Example-3

Write a program ask about triangle sides ,and determine if it is right triangle, and compute it is area and circumference.

Solution

```
        Input x,y,z
        If x+y>z and y+z>x and x+z>y then ? "right triangle"
        C=x+y+z
        S=C/2
        Ar=sqr(s*(s-x)*(s-y)*(s-z))
        Print "the circumference is"C
        Print "the area is"ar
```

Example-4

Write a program to compute the F(x) value where:

$$F(x)= \begin{cases} 0.5 x & \text{if } x<1 \\ 0.5(3-x) & \text{if } 1 \le x \le 2 \\ 0.5 & \text{if } x >2 \end{cases}$$

Run the program for N of X values.

Solution

```
        Print "X          Fx":  Print "-------------"
        Read N
        I=1
5       Read X
        If X<1 go to 20
        If X>= 1 and X<=2 go to 10
        Fx=0.5
        Go to 30
10      Fx=1/2*(3-x)
        Go to 30
20      Fx=x/2
        Print x,fx
30      I=I+1
        If I < N go to 5
        Data 10, 2,1,3,6,-2,3,1,2,6,7
```

4.The ON … Go To Statement

the general form of the on …go to statement is

ON expression Go To Line number[, line number] etc.

Where expression may be a single variable or any combination of variables and numbers. this expression must be evaluated, must be a positive number, and then must be truncated to a positive integer. if the integer is 1,then control goes to the first line number following the go to, if the integer is 2 , then control goes to the second line number following the go to, and so on. an expression less than 1 or greater than the number of line numbers given constitutes an error that will stop the program.

Example-1

Write a program to find Z value where :

$$Z \begin{cases} 2 & k=1 \\ 2K^3-3 & k=2 \\ -2 & k=3 \\ K & k<1 \text{ or } k>3 \end{cases}$$

     Read K
     On K go to 10,20,30
     Z=k
     Go to 40
10 **Z=2**
     Go to 40
20 **Z=2*k^3-3**
     Go to 40
30 **Z=-2**
40 **Print K,Z**
     Data 2

Example-2

Write a program to compute Q value where:

$$Q=\left|X^2+1\right| \qquad \text{if k=1}$$

$$Q=\sqrt{\left|X^2+Y\right|} \qquad \text{if k=2}$$

$$Q=\log\left(Y^2+3X\right) \qquad \text{if k=3}$$

Solution

     Read X,Y
     Read K
     On K go to 10 ,20,30
10 **Q=ABS(X^2+1)**
     Go to 40
20 **Q=SQR(ABS(X^2+Y))**
     Go to 40
30 **Q=log (Y^2+3*X)**
40 **Print Q**
     Data

Example-3

Sample taken from engineering students college departments, Building and construction, Software, Architecture, Material, write a program to classify the students by their departments, the size sample is(n),and the symbol for each department as fallows:

    K=1 for Building and construction students
    K=2 for Software students
    K=3 for Architecture students
    K=4 for Material students

```
        S1=0:S2=0:S3=0:S4=0
        Input n
        I=0
5       Input k
        On k go to 10,20,30,40
10      S1=S1+1
        Go to 50
20      S2=S2+1
        Go to 50
30      S3=S3+1
        Go to 50
40      S4 = S4+1
50      I=i+1
        If i < n go to 5
        Print S1,S2,S3,S4
```

The For and Next Statements

The general form of the for and next stamens are:

For loop variable = exp1 to exp2 [step exp3]
Next loop variable

Where loop variable is a numeric variable, and must be the same variable in both of the statements. The expressions denoted by exp1,exp2,and exp3 may consist of numeric constants or variables , or combinations of numeric variables and constants with one condition. that is the value of exp3, when added repeatedly to exp1,must finally go beyond exp2.if the step has been omitted ,then exp3 is set equal to 1.

The purpose for the companion for and next statements is to guide control through the set of statements located between the for and next statements.

Example-1

Write a program to print the summation and multiplication of the numbers from 1 to 50.

Solution

```
S=0:P=1
For n=1 to 50
S=S+n
P=P*N
Next n
Print "the summation is"S
Print the multiplication is"P
```

Example-2

Write a program to compute P value where: $P=(1)^2+(3)^2+(5)^2+\ldots\ldots+(25)^2$.

Solution

P=0
For i=1 to 25 step 2
P=P+i^2
Next i
Print P

Example-3

Write a program to find the maximum value from list of 10 numbers.

Solution

REM Program for find maximum value
READ x
MX=X
For i= 2 to 10
Read X
If X>MX then MX=X
Next i
Print "the maximum is";MX
Data 20,3,27,98,70,54,1,60,34,90

Example-4

Write a program to find the summation of 10 different numbers.

Solution

REM Program for find the summation
For i= 1 to 10
Read X
S=S+X
Next i
Print "summation is"; S
Data 5,8,90,67,45,3,2,88,6,1

Example-5

Write a program to compute the (N!) value. where N!=1*2*3….N

Solution

REM Program for find factorial value
Input N
F=1
For i= 1 to N
F=f*i
Next i
Print "the factorial is ";f

Example-6

Write a program to compute the summation of the series $S = \sum\limits_{x=1}^{x=30} \dfrac{x}{x+1}$

Solution

For x=1 to 30
S=S+x/(x+1)
Next x
?S

Example-7

Write a program to compute the mean and ST where:

$\text{Mean} = \sum X_i / n \ , V = \dfrac{\sum X_i^2 - (\sum X_i)^2 / n}{n-1}$

Solution

Input N
For i=1 to n
Input x
S=S+x
SS=SS+x^2
Next i
Me = S/n
V=(SS-S^2/n)/(n-1)
ST=SQR(V)
Print "mean=";me
Print "var=";V
Print"STA=';ST

Example-8

If N$ represent student name and X represent student degree ,write a program to print names and averages of the successful students only, if you know the successful degree 50% and the number of subject (5) and the number of students(150).

Solution

For i= 1 to 150
Input "name";N$
S=0
For K=1 to 5
Input X
If X<50 go to 10
S=S+X
Next K
M=S/5
Print "mean=';m
10   Next i

Example-9

Write a program to compute the summation of the series $S=1 +x+x^2/2!+x^3/3!$.

Solution

Read x
For i=0 to 3
F=1
For j=1 to i
F=f*j
Next j
S=S+x^i/f
Next i
Print S
Data 2

Example-10

Write a program to compute the summation of following series(use 20 term)
$S=1+1/2!+1/3!+1/4!+1/5!+\ldots\ldots\ldots$

Solution

N=1 : k=1
5   f=1
For i=1 to k
F=f*i
Next i
S=S+1/f
K=k+1
N=n+1
If n<=20 then 5
? S

Example-11

Write a program to compute cosx from the series :
$Cos(x)=1-x^2/2!+x^4/4!-x^6/6!+\ldots\ldots$,the program is stop when term value less than or equal 10^{-5}.

Solution

Read X
X=X*3.141592/180
K=1 : i=0
5 F=1
For j=1 to i: f=f*j :next j
T=x^i/f
If abs(t)>= 10^-5then
S=S+T*k
I=i+2 : k=-k
Go to 5
Print S
Data 3

26

Example-12

Write a program read x value then compute S value from the following series:

$$S = \left(\frac{X-1}{X}\right) + \frac{1}{2}\left(\frac{X-1}{X}\right)^2 + \frac{1}{3}\left(\frac{X-1}{X}\right)^3 + \ldots + \frac{1}{10}\left(\frac{X-1}{X}\right)^{10}$$

Repeat the procedure to 4 of x values.

Solution

```
        I=1
10    Read X
        N= (x-1)/x
        For j=1 to 10
        S=S+n^j
        Next j
        Print X,S
        I=I+1
        If I<=4 then 10
        End
        Data 4
```

Example-13

write a program read x value then compute z value from the following series(use 20 term):

$$Z = X - \frac{X^2}{4!} + \frac{X^4}{8!} - \frac{X^6}{12!} + \ldots$$

Solution

```
        N=2 : j=1:k=1
        Read X
10    F=1
        For i=1 to n
        F=f*i
        Next i
        T=x^(n/2)/f
        Z=Z+T*k
        N=n+2
        j=j+1
        k=-k
        If j <=20 then 10
        Print Z
        Data 5
```

Example-14

Dam contain water with width(W) and high (H) change from 0 to 100 m increase 5 m. write a program to compute force water FW and moment MO ,if you know :

$FW=\theta.W.G.H^2/2$

$MO=FW. H/3$

Where G=9.8 , $\theta=1$

Solution

G=9.8 : θ=1
Read W
For H=0 to 100 step 5
FW= θ*W*G*H^2/2
MO=FW* H/3
F=F+ FW
M= M+MO
Next H
Print " The Force is";F
Print " The Moment is:;M
data