**Tutorial (3)**

**Q1:** Design an algorithm which gets a value, n, as its input and calculates odd numbers equal or less than n. Then write them in the standard output.

Solution:

```
1  START
2  READ N
3  I=1
4  WRITE I
5  I=I+2
6  IF (I<=N) GOTO 4
7  END
```

**Q2:** Write a program to calculate the factorial (!) of a given number.

Solution:

REM Calculate the factorial of any number
F=1
INPUT “The number need to get its factorial= “;N
FOR P=N TO 1 STEP -1
F=F*P
NEXT P
PRINT “The Factorial of the number= “;F

**Q3:** Write a program to find the largest number between three numbers A,B and C then calculate the Natural Exponent for this number (Write the program using READ/DATA statement).

Solution:

REM
READ A,B,C
DATA 50,70,90
L=A
IF B>A and B<C THEN L=B
IF C>A and C>B THEN L=C
K=EXP(L);
PRINT “The Largest number between the three numbers is =” ;L
PRINT “The Natural Exponent for the largest number is =” ;K
END

Q4: Write a program to get the following table of numbers using FOR-TO ...NEXT statement.

```
1
2  1
3  2  1
4  3  2  1
5  4  3  2  1
```

Solution:

```
CLS
REM Table of Numbers
FOR r=1 TO 5
    FOR c=r TO 1 STEP -1
        PRINT c;
    NEXT c
    PRINT
NEXT r
END
```

Q5: Write a program to get the following table of numbers using FOR-TO ...NEXT statement.

```
1
1  2
1  2  3
1  2  3  4
1  2  3  4  5
1  2  3  4  5  6
1  2  3  4  5  6  7
1  2  3  4  5  6  7  8
1  2  3  4  5  6  7  8  9
1  2  3  4  5  6  7  8  9  10
```
Solution:

CLS
REM
FOR R=1 TO 10
    FOR C=1 TO R
        PRINT C;
    NEXT C
PRINT
NEXT R
END

Q6: Write a program to evaluate any Quadratic Equation.

REM Quadratic Equation (Uses Square Root Function)
PRINT "Ax^2 + Bx + C = 0"
INPUT "A = ", A
INPUT "B = ", B
INPUT "C = ", C
D = B * B - 4 * A * C
IF D > 0 THEN
    DS = SQR(D)
    PRINT "REAL ROOTS:", (-B - D) / (2 * A), (-B + D) / (2 * A)
ELSE
    IF D = 0 THEN
        PRINT "DUPLICATE ROOT:", (-B) / (2 * A)
    ELSE
        DS = SQR(-D)
        PRINT "COMPLEX CONJUGATE ROOTS:", (-B / (2 * A)); "+/-"; DS / (2 * A); "i"
    END IF
END IF

Q7: Write a program to find the max, min and mean for any number.

REM ELEMENTARY STATISTICS
PRINT "N numbers - Find max, min, and mean"
INPUT "N = ", N
MAX = 1E-30
MIN = 1E+30
SUM = 0
FOR I = 1 TO N
    PRINT "; I;
    INPUT X
    IF X > MAX THEN MAX = X
    IF X < MIN THEN MIN = X
    SUM = SUM + X
NEXT
PRINT "Maximum =", MAX, "Minimum=", MIN
PRINT "Sum =", SUM, "Mean = ", SUM / N
Q8: Run the following statements:

SCREEN 12
PSET (100, 80), 1
LINE -(200, 80), 1
LINE (60, 10)-(150, 80), 12
LINE (250, 20)-(300, 90), 11, B
LINE (350, 20)-(400, 90), 2, BF
    FOR I = 10 TO 90 STEP 20
    CIRCLE (320, 240), I, 4
    NEXT

Q9: Write a function to return the factorial of a number.

FUNCTION factorial (n)
    f = 1
    FOR i = 2 TO n
        f = f*i
    NEXT i
    factorial = f
END FUNCTION

Q10: Write a function for the Hyperbolic cosine series and evaluate it to \(x=2\), \(N=6\):

\[
cosh x = x + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + \frac{x^N}{N!} \ldots
\]