

Lecture 5

1 Examples of order evaluation:

Example 1:

Write the following equation as a C++ expression:

$$f = \frac{a + b + c + d + e}{10}$$

Solution:

`f = (a + b + c + d + e) / 10;`

Note: the parentheses here are required because division has higher precedence than addition.

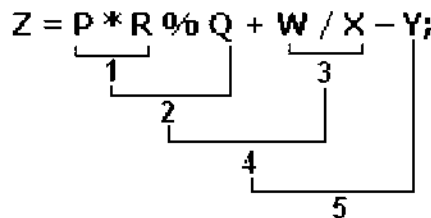
Example 2:

State the order of evaluation for the following expression:

`Z = P * R % Q + W / X - Y;`

Solution:

1. *
2. %
3. /
4. +
5. -



Example 1



Write C++ program to perform the above equation:

```
#include<iostream.h>
void main( )
{
    int Z, P, R, Q, W, X, Y;
    cout << "enter P:"; cin >> P;
    cout << "enter R:"; cin >> R;
    cout << "enter Q:"; cin >> Q;
    cout << "enter W:"; cin >> W;
    cout << "enter X:"; cin >> X;
    cout << "enter Y:"; cin >> Y;
    Z= P * R % Q + W / X - Y;
    cout << "the result="<< Z;
```

2 The "math.h" Library:

The "math.h" library contains the common mathematical function used in the scientific equations.

Common function from math.h library:	
Mathematical Expression	C++ Expression
e^n	Exp(x)
$\text{Log}(x)$	Log10(x)
$\text{Ln}(x)$	Log(x)
$\text{Sin}(x)$	Sin(x)
x^n	Pow(x,n)
\sqrt{x}	Sqrt(x)

Example:

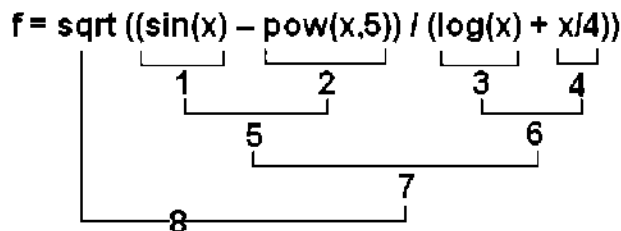
Write the following equation as a C++ expression and state the order of evaluation of the binary operators:

$$f = \sqrt{\frac{\sin(x) - x^5}{\ln(x) + \frac{x}{4}}}$$

Solution:

`f = sqrt ((sin(x) - pow(x,5)) / (log(x) + x/4))`

Order of evaluation:



Exercise:

Write the following equation as a C++ expression and state the order of evaluation of the binary operators:

$$z = \sqrt{\frac{x^2 y - 3 \sin(x)}{\tan x^3 + x^3 / y}}$$

Solution: ?

The ++ and - - operators can be written either before the variable (prefix notation) or after the variable (postfix notation) as in the following:

Prefix notation:	++ X	X is incremented before its value is taken or returned to current statement.
Postfix notation:	X ++	X is incremented after its value is taken or returned to current statement.

The difference between the Prefix and Postfix notations:

Prefix notation

```
int y;  
int x = 7;  
cout<< ++x <<endl;  
y=x;  
cout<<y;
```

Output:

8
8

Postfix notation

```
int y;  
int x = 7;  
cout<< x++ <<endl;  
y=x;  
cout<<y;
```

Output:

7
8

3 Manipulator Functions:

They are special stream functions that change certain characteristics of the input and output.

(a) **Endl**: Generate a carriage return or line feed character.

 Cout << "a" << endl;

(b) **Setbase**: It is used to convert the base of one numeric value into a nother base

 Dec(base 10), hex(base 16), oct(base 8)

Example 2

 Write C++ program to convert a base of a number:

```
#include<iostream.h>  
void main( )  
{  
    int value;  
    cout << "enter number:"; cin >> value;  
    cout << "Decimal base="<<dec<<value<<endl;  
    cout << "Hexadecimal base="<<hex<<value<<endl;  
    cout << "Octa base="<<oct<<value<<endl;  
}
```

Enter number
10
Decimal base=10
Hexadecimal base=a
Octal base=12

When using setbase the statement will be:

```
Cout<<"Decimal base="<<setbase(10);
```

```
Cout<<value<<endl;
```

(c) Setw: It is used to specify the minimum number of character positions on the O/P field a variable will consume: **setw(int w)**

Example 3



Write C++ program to use tab:

```
#include<iostream.h>
#include<iomanip.h>
void main( void)
{
    int a,b;
    a=200;
    b=300;
    cout<<a<<'\'<<b<<endl;
}
```

200 300

Example 4



Write C++ program to use setw:

```
#include<iostream.h>
#include<iomanip.h>
void main( void)
{
    int a,b;
    a=200;
    b=300;
    cout<<setw(5)<<a<<setw(5)<<b<<endl;
    cout<<setw(6)<<a<<setw(6)<<b<<endl;
}
```

200 300
200 300

(d) Setfill: It is used to specify a different character to fill the unused field width of the value. **Setfill(char f)**

Example 5

 Write C++ program to use setfill:

```
#include<iostream.h>
#include<iomanip.h>
void main( void)
{
    int a,b;
    a=200;
    b=300;
    setfill('*');
    cout<<setw(5)<<a<<setw(5)<<b<<endl;
    cout<<setw(6)<<a<<setw(6)<<b<<endl;
}
```

```
**200**300
***200***300
```

(e) **Setfill**: It is used to control the number of digits of an output stream display of a floating point value. **Setprecision (int p)**

Example 6

 Write C++ program to use setprecision:

```
#include<iostream.h>
#include<iomanip.h>
void main( void)
{
    float a,b,c;
    a=5; b=3; c=a/b;
    setfill('*');
    cout<<setprecision(1)<<c<< endl;
    cout<<setprecision(5)<<c<< endl;
}
```

```
1.7
1.66667
```

WORK SHEET (2)

First Elements of C++

- Q1: What do you mean by C++ character set?
- Q2: What do you mean by identifiers? What is the maximum length of identifiers?
- Q3: What do you mean by case-sensitive?
- Q4: What do you mean by reserved word?
- Q5: Write a general layout of C++ program. Comment on each part of it.
- Q6: What is the main purpose of endl and \n ?
- Q7: List and comment on the special escape codes.
- Q8: What are the main types of variables, their sizes, and their range of values?
- Q9: What do you mean by constants?
- Q10: List the priorities of the arithmetic operations.
- Q11: Find the value of A for the following:
$$A = (5 + 2 * 3 + ((3 - 2) * 7) + -9) / 2.$$
- Q12: What are the main keywords included in iostream.h and math.h?
- Q13: What are the main differences between prefix and postfix notation?
- Q14: Find the value of B (true or false) for the following:
i = 5;
j = 9;

`B= ! ((i > 0) && (i >= j));`

Q15: Write C++ program to read x and compute sin, cos, and tan of x.

Q16: Rewrite the equivalent statements for the following examples, and find its results. Assume: $X=2$, $Y=3$, $Z=4$, $V=12$, $C=8$.

($X+=5$, $Y-=8$, $Z*=5$, $V/=4$, $C\%=3$)

Q17: Given that A and B are real variables with values 1.5, and 2.5 respectively, and C is integer variable with value 3, evaluate the following: NOT ($A < 0$) AND ($B/C \leq 0$).

Q18: Write a program in C++ to find the area of a circle.

Q19: Write a program to read a set of (5) real no.s and find out the sum and average of them.