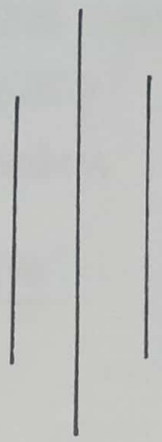
KATHMANDU UNIVERSITY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING



A

Lab Report on

Object Oriented Programming {COMP116}

Lab Work No:- 1

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Submission date: 25/08/2023

LAB WORK SESSION: 1

In lab session 1, we tried out questions that helped us enhance our understanding on procedural aspect of C++ and the use of namespaces.

<Q.1>: WAP that takes two integers from the user and prints the following

a) Sum of two numbers (b) Product of two numbers.

Ans:

+) Source Code:

```
#include <iostream>
int main()
{
   int a, b;
   int prod, sum;
   std:: cout << "Enter two numbers " << std:: endl;
   std:: cin >> a >> b;
   sum = a+b; prod = a*b;
   std:: cout << "The numbers are " << a << " " << b
   << endl " with sum and product is " << sum << " "
    << prod << std:: endl;
   std:: cin.get();
   return 0;
}
```

+) Output

```
Enter two numbers
3
4
The two numbers are 3 4 4 whose sum
and product is 7 and 12.
```

+) Description

Here, the program takes two numbers as input ie. 3 4 4. Then operation of addition and multiplication is done.
Then, the sum and product was displayed along with the numbers.

<Q.2> Write a function to swap two numbers (using references).

Ans

+) Source Code:

```
#include <iostream>
void swap (int &, int &);
void swap (int &x, int &y)
{
  int t;
  t = x;
  x = y;
  y = t;
}
```



```
int main()
{
  int a, b;
  std:: cout << "Enter two numbers" << std::endl;
  std:: cin >> a >> b;
  std:: cout << "Before swap a= " << a << "and b=" << b
       << std:: endl;
  swap (a, b);
  std:: cout << "After swap a= " << a << "and b= " << b
       << std:: endl;
  return 0;
}
```

+) Output

```
Enter two numbers
1
2
Before swap a = 1 and b = 2
After swap a = 2 and b = 1
```

+) Description:

This program reads two numbers 1 and 2 and swaps their values. While taking input, variable a and b are 1 and 2. The function swap switches the values and displays a and b are 2 and 1

<Q.3> Try and show the output

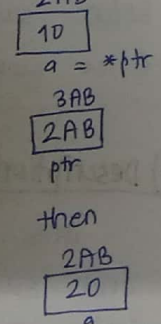
```
#include <iostream>
int main()
{
    int a = 10;
    int *ptr = &a;
    std:: cout << " ptr = " << ptr << std:: endl;
    std:: cout << " &ptr = " << &ptr << std:: endl;
    std:: cout << " &a = " << &a << std:: endl;
    std:: cout << " a = " << a << std:: endl;
    std:: cout << " *ptr = " << *ptr << std:: endl;
    *ptr = 20
    std:: cout << " a = " << std:: endl
}
```

Ans:

+) Output:

```
ptr  = 2AB
&ptr = 3AB
&a   = 2AB
a    = 10
*ptr = 10
a    = 20
```

Suppose,



+) Description:

Here, ptr contains address of a. a contains value integer. *ptr is dereferenced pointer that gives value of a.

<Q.4> Write a program to input 10 double-precision floating-point numbers from the user, store them in an array, and computes mean and standard deviation of array.

$$\sigma = \sqrt{\frac{\sum (x_j - \bar{x})^2}{N-1}}$$

Ans

+) Source Code:

```
#include <iostream>
#include <cmath>
int main()
{  int n = 10;
   double a[15], sum, mean, dif[15], difs[15],
          variancesum, variance, sd;
   for (int i=0; i<n; i++)
   {  cout  std:: cout << "Enter 10 double values " << std:: endl
    for (int i=0; i<n; i++)
    {
       std:: cin >> a[i];
       sum = sum + a[i];
    }
    mean = sum/n;
    for (int i=0; i<10; i++)
    {
       dif[i] = a[i] - mean;
       difs[i] = pow(dif[i], 2);
    } variancesum = variancesum + difs[i];
}
```

```
    variance = variance sum / (n-1) ;
    Sd = sqrt (variance);
    std:: cout << " Mean = " << mean <<std:: endl;
    std:: cout << " Standard deviation = "<< sd <<std:: endl;
    return 0;
}
```

+) Output

```
Enter 10 double values
10.98
11.68
28.69
69.38
22.44
88.55
66.81
76.51
53.68
40.20
Mean = 46.892000000000000
standard deviation =28.017285698010000
```

+) Description

This program reads 10 double precision values from the user. This program then calculates the mean and standard deviation.

<Q.5> WAP to calculate the volume and surface area of a cube, cylinder and cylinder using function overloading. Define all the functions related to volume in namespace n1 and those of surface area in namespace n2.

Ans:

```
#include <iostream>
#include <cmath>
#include <string>   #define PI 3.14
namespace ns1
{
    double volume (double );
    double volume (double, double);
    double volume (double, double, double);
}
namespace ns2
{
    double area (double);
    double area (double, double);
    double area( double, double, double);
}
double ns1:: volume (double a)
{ return pow(a,3); }
double ns1:: volume (double a, double b)
{ return PI * pow(a,2) * b; }
double ns1:: volume (double l, double w, double h)
{ return (l*w*h)|3; }
```

```
double ns2:: area (double a)
{ return    6* pow(a,2); }
double ns2:: area (double a, double b)
{ return    (2*PI* a*b) + (2*PI* pow(a,2)); }
double ns2:: (double l, double w, double h)
{
  return   (l*w) + (l* pow (pow (w/2,2) + pow (h,2), 1/2))
           + (w* pow (pow (l/2,2) + pow (h,2), 1/2)); }

int main ()
{
  std:: cout<< "Enter which shape you want
               1. Cube   2. Cylinder   3. Pyramid "
               << std:: endl;
  string choice;
  getline (cin, choice);
  string str1 = "Cube "; string str2 = "Cylinder ";
  string str3 = " Pyramid ";
  int choicen;
  if (stremp (choice, str1) == 0)
  { choicen = 1; }
  elseif (stremp (choice, str2) == 0)
   { choicen = 2; }
  elseif (stremp (choice, str3) == 0)
   { choicen = 3; }   else { std:: cout << "wrong input"; }
  std:: cout << " You want? 1. Volume  2. Area "
             << std:: endl;
```



```
  string choice2;
  getline (cin, choice2);
  string str4 = " Volume";
  string str5 = " Area";
  int nchoice;
  if (stremp (choice2, str4) == 0)
   { nchoice = 1; }
  elseif (stremp (choice2, str5) == 0)
   { nchoice = 2; }
  else
   { std:: cout<< " Enter correct option "<<std:: endl; }
  switch (choicen)
  {
   case 1:
   if (nchoice ==  std:: cout << "Enter length " <<std:: endl;
     double length) & volume, area  double len, vol, ar;
   std:: cin >> length;
   if (nchoice == 1)
   { vol = ns1:: volume (len);
     std:: cout << " Volume of cube "<< vol <<std:: endl; }
   if (nchoice == 2)
   { ar = ns2:: area (len);
     std:: cout << "Area of cube" << ar << std:: endl; }
   case 2:
   std:: cout << "Enter radius & length "<< std:: endl;
   double ra, hei, vol, ar;
   std:: cin >> ra >> hei;
```

```
if (nchoice == 1)
{ vol = ns1:: volume(ra, hei);
  std:: cout<< " Volume "<<vol <<std:: endl; }
if (nchoice == 2)
{ ~~int~~ ar = ns2:: area(ra, hei);
  std:: cout << " Area "<< ar <<std:: endl; }
case 3 :
std:: cout << "Enter length, width & height "<<std::endl;
double len, wid, hei, vol, ar;
if (nchoice == 1)
{ vol = ns1:: volume( len, wid, hei);
  std:: cout<< "Volume" << vol <<std:: endl; }
if (nchoice == 2)
{ ar = ns2:: area ( len, wid, hei);
  std:: cout << " Area " << ar <<std:: endl; }
default
  std:: cout << " No correct value "<<std:: endl;
} ~~return 0;~~ }
return 0; }
```

*) Output


```
Enter which shape 1. Cube 2. Cylinder 3. Pyramid.
Cube
You want? 1. Volume 2. Area.
Volume
Enter length
6.89015
Volume of Cube = 327.104131900000000
```

*) Description:

This ~~if~~ program has volume and area functions declared on separate namespaces. The program takes the shape of the required object and asks for ~~weather~~ area or volume. The input taken is string. According to the users choice, the necessary / recommended output is shown.