

# C++ Assignment

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B.Tech[CSE] II<sup>nd</sup> Semester, Section-A

2016-310-060

Questions:

1. The employee's basic salary is input through the keyboard write a program to find his gross salary. If his basic salary is less than Rs. 1500, then HRA=10% of basic salary and DA=25% of basic. If his salary is either equal to or above Rs. 1500, then HRA=Rs. 500 and DA=50% of basic.
2. The marks obtained by a student in 5 different subjects are input through the keyboard. The student gets a division as per the following rules:

**Percentage above or equal to 75 – Honors**  
**Percentage above or equal to 60 – First Division**  
**Percentage between 50 and 59 – Second Division**  
**Percentage between 40 and 49 – Third Division**  
**Percentage less than 40 – Fail**

Write a program to calculate the division obtained by the student.

3. If a number 972 is entered through the keyboard, your program should print "**Nine Seven Two**". Write a program such that it does this for any positive integer.
4. While purchasing certain items, a discount of 10% is offered if the quantity purchased is more than 1000. If quantity and price per item are input through the keyboard, write a program to calculate the total expenses.
5. Any character is entered through the keyboard, write a program to determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol. The following table shows the range of ASCII values for various characters.

Characters	ASCII Values
A-Z	65-90
a-z	97-122
0-9	48-57
Special symbols	0-47, 58-64, 91-96, 123-127

6. Write a program to find the factorial value of any number entered through the keyboard.
7. Two numbers are entered through the keyboard. Write a program to find the value of one number raised to power of another.
8. Write a program to print all the ASCII values and their equivalent characters using a while loop. The ASCII values vary from 0 to 255.
9. Write a program to print out all Armstrong numbers between 1 to 500. If sum of cubes of each digit of the number is equal to the number itself, then the number is called an Armstrong number. **For example,  $153 = (1*1*1) + (5*5*5) + (3*3*3)$ .**
10. Write a program to enter the numbers till the user wants and at the end it should display the count of positive, negative and zeros entered.
11. Write a program to demonstrate virtual base class.
12. Write a program to demonstrate pointer to an object.
13. Write a program to demonstrate function overloading.
14. Write a program to demonstrate multiple inheritance.
15. Write a program to demonstrate single-level inheritance.
16. Write a program to demonstrate operator overloading.
17. Write a program to demonstrate friend function.
18. Write a program to demonstrate templates.
19. Write a program to demonstrate constructor.
20. Write a program to demonstrate multi-level inheritance.

```
C:\Users\ashra\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\CodeBlocks\ques1.exe"
Enter Basic Salary:
1500
Gross Salary= Rs.2750

Process returned 0 (0x0)   execution time : 5.098 s
Press any key to continue.
```

```
/* Calculation Of Gross Salary
 * ques1.cpp
 *
 * Created on: 10-Apr-2017
 * Author: shahique
 */
#include<iostream>
using namespace std;

class employee
{
    float sal, hra, da, gs;
public :
    void getdata(void);
    void display(void);
};

void employee::getdata(void)
{
    cout<<"Enter Basic Salary:"<<endl;
    cin>>sal; //read basic salary

    if(sal<1500)
    {
        hra=(10/100.0)*sal; //calculation of house rent agreement
        da=(25/100.0)*sal; //calculation of dearness allowance
        gs=hra+da+sal; //calculation of gross salary
    }
    else
    {
        hra=500;
        da=(50/100.0)*sal;
        gs=hra+da+sal;
    }
}
void employee::display(void)
{
    cout<<"Gross Salary= Rs."<<gs<<endl;
}
int main()
{
    employee e1; //creating an object
    e1.getdata();
    e1.display();
    return(0);
}
```

```
/* Calculation Of Grade
 * ques2.cpp
 *
 * Created on: 17-Apr-2017
 * Author: shahique
 */
#include<iostream> //including header file
using namespace std;
class student
{
    float m1, m2, m3, m4, m5, percentage;
public :
    void getdata(void);
    void display(void);
};
void student::getdata(void)
{
    cout<<"Enter marks in 5 subjects:"<<endl;
    cin>>m1>>m2>>m3>>m4>>m5; //input marks of 5 subjects

    percentage=(m1+m2+m3+m4+m5)/5; //calculation of percentage
}
void student::display(void)
{
    if(percentage>=75) //calculation of grade
        cout<<"Honors"<<endl;
    else if(percentage>=60)
        cout<<"First Division"<<endl;
    else if(percentage>=50)
        cout<<"Second Division"<<endl;
    else if(percentage>=40)
        cout<<"Third Division"<<endl;
    else
        cout<<"Fail"<<endl;
}
int main()
{
    student s1; //creating an object s1
    s1.getdata();
    s1.display();
    return(0);
}
```

```
C:\Users\ashra\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\CodeBlocks\ques2.exe"
Enter marks in 5 subjects:
78
85
95
82
93
Honors

Process returned 0 (0x0)   execution time : 10.619 s
Press any key to continue.
```

```
/* Conversion Of Digits into Words
 * ques3.cpp
 *
 * Created on: 17-Apr-2017
 * Author: shahique
 */
#include<iostream>      //including header file
using namespace std;
class conversion
{
    unsigned int num, revNum=0;
    int lastDigit=0;
public :
    void getdata(void);
    void display(void);
};

void conversion::getdata(void)
{
    cout<<"Enter any positive integer:"<<endl;
    cin>>num;
    while(num!=0)
    {
        lastDigit=num%10;
        revNum=revNum*10+lastDigit;
        num/=10;
    }
}

void conversion::display(void)
{
    while(revNum!=0)
    {
        lastDigit=revNum%10;
        switch(lastDigit)
        {
            case 1:
                cout<<"One ";
                break;
            case 2:
                cout<<"Two ";
                break;
            case 3:
                cout<<"Three ";
                break;
            case 4:
                cout<<"Four ";
                break;
            case 5:
                cout<<"Five ";
                break;
            case 6:
                cout<<"Six ";
                break;
            case 7:
                cout<<"Seven ";
                break;
            case 8:
                cout<<"Eight ";
                break;
            case 9:
                cout<<"Nine ";
                break;
            default:
                cout<<"Zero ";
                break;
        }
        revNum/=10;
    }
}
```

```
    }
}

int main()
{
    conversion c1;
    c1.getdata();
    c1.display();
    return(0);
}
```

```
C:\Users\ashra\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\CodeBlocks\ques3.exe"
Enter any positive integer:
200514
Two Zero Zero Five One Four
Process returned 0 (0x0) execution time : 20.026 s
Press any key to continue.
```

```
/* Calculation Of Total Expense
 * ques4.cpp
 *
 * Created on: 17-Apr-2017
 * Author: shahique
 */
#include<iostream>      //including header file
using namespace std;
class shop
{
    int quantity;
    float price, totalExpense;
public :
    void getdata(void);
    void display(void);
};
void shop::getdata(void)
{
    cout<<"Enter Price:"<<endl;
    cin>>price;
    cout<<"Enter Quantity:"<<endl;
    cin>>quantity;

    if(quantity>1000)
        totalExpense=(price*quantity)-(0.1*(price*quantity));
    else
        totalExpense=price*quantity;
}
void shop::display(void)
{
    cout<<"Total Expense=Rs."<<totalExpense<<endl;
}
int main()
{
    shop s1;
    s1.getdata();
    s1.display();
    return(0);
}
```

```
C:\Users\ashra\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\CodeBlocks\ques4.exe"
Enter Price:
10
Enter Quantity:
1001
Total Expense=Rs.9009

Process returned 0 (0x0)   execution time : 7.985 s
Press any key to continue.
```

```
/* To check whether the character entered is a capital case, small case, digit or a special
symbol
* ques5.cpp
*
* Created on: 18-Apr-2017
* Author: shahique
*/
#include<iostream>      //including header file
using namespace std;
class characterCheck
{
    char input;
public :
    void getdata(void);
    void display(void);
};
void characterCheck::getdata(void)
{
    cout<<"Enter any character:"<<endl;
    cin>>input;
}
void characterCheck::display(void)
{
    if(input<=90&&input>=65)
        cout<<"Captial Letter"<<endl;
    else if(input<=122&&input>=97)
        cout<<"Small Case Letter"<<endl;
    else if(input<=57&&input>=48)
        cout<<"Digit"<<endl;
    else
        if((input<=47&&input>=0)|| (input<=64&&input>=58)|| (input<=96&&input>=91)|| (input<=127&&input>=123))
            cout<<"Special Symbol"<<endl;
}
int main()
{
    characterCheck c1;
    c1.getdata();
    c1.display();
    return(0);
}
```

```
C:\Users\ashra\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\CodeBlocks\ques5.exe"
Enter any character:
!
Special Symbol
Process returned 0 (0x0) execution time : 6.501 s
Press any key to continue.
```

```
/* Factorial of a number
 * ques6.cpp
 *
 * Created on: 18-Apr-2017
 * Author: shahique
 */
#include<iostream>
using namespace std;
class factorial
{
    float number, fact=1;
public :
    void getdata(void);
    void display(void);
};
void factorial::getdata(void)
{
    cout<<"Enter any number:"<<endl;
    cin>>number;

    while(number!=0)
    {
        fact*=number;
        number--;
    }
}
void factorial::display(void)
{
    cout<<"Factorial="<<fact<<endl;
}
int main()
{
    factorial f1;
    f1.getdata();
    f1.display();
    return(0);
}
```

```
"C:\Users\ashra\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\CodeBlocks\ques6.exe"
Enter any number:
5
Factorial=120

Process returned 0 (0x0)  execution time : 1.437 s
Press any key to continue.
```

```
/* Exponential function
 * ques7.cpp
 *
 * Created on: 18-Apr-2017
 * Author: shahique
 */
#include<iostream>
#include<cmath>
using namespace std;
class exponential
{
    float n1,n2, newNum;
public :
    void getdata(void);
    void display(void);
};
void exponential::getdata(void)
{
    cout<<"Enter 1st number:"<<endl;
    cin>>n1;
    cout<<"Enter 2nd number:"<<endl;
    cin>>n2;

    newNum=pow(n1,n2);
}
void exponential::display(void)
{
    cout<<n1<<"^"<<n2<< "="<<newNum<<endl;
}
int main()
{
    exponential f1;
    f1.getdata();
    f1.display();
    return(0);
}
```

```
"C:\Users\ashra\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\CodeBlocks\ques7.exe"
Enter 1st number:
4
Enter 2nd number:
3
4^3=64

Process returned 0 (0x0)   execution time : 5.699 s
Press any key to continue.
```

```
/* ASCII values and their equivalent character
 * ques8.cpp
 *
 * Created on: 18-Apr-2017
 * Author: shahique
 */
#include<iostream>
using namespace std;
int main()
{
    int i=0;
    while(i!=256)
    {
        cout<<i<<"-"<<char(i)<<endl;
        i++;
    }
    return(0);
}
```

```
C:\Users\ashra\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\CodeBlocks\ques8.exe"
230-μ
231-τ
232-Φ
233-Θ
234-Ω
235-δ
236-∞
237-φ
238-ε
239-η
240-≡
241-±
242-≥
243-≤
244-
245-|
246-÷
247-≈
248-°
249-..
250-..
251-√
252-⁹
253-²
254-■
255-

Process returned 0 (0x0)   execution time : 0.281 s
Press any key to continue.
```

```
/* Armstrong numbers b/w 1-500
 * ques9.cpp
 *
 * Created on: 18-Apr-2017
 * Author: shahique
 */
#include<iostream>
using namespace std;
int main()
{
    int num, temp, lastDigit, sum;
    cout<<"Armstrong Numbers b/w 1-500"<<endl;
    for(num=1;num<=500;num++)
    {
        sum=0;
        temp=num;
        while(temp!=0)
        {
            lastDigit=temp%10;
            sum+=lastDigit*lastDigit*lastDigit;
            temp/=10;
        }
        if(sum==num)
            cout<<num<<endl;
    }
    return 0;
}
```

```
C:\Users\ashra\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\CodeBlocks\ques9.exe"
Armstrong Numbers b/w 1-500
1
153
370
371
407

Process returned 0 (0x0) execution time : 0.099 s
Press any key to continue.
```

```
/* Counting of positive, negative and zero numbers
 * ques10.cpp
 *
 * Created on: 18-Apr-2017
 * Author: shahique
 */
#include<iostream>
using namespace std;
class numberType
{
    int choice, num, countPos=0, countNeg=0, countZero=0;
public :
    void getdata(void);
    void display(void);
};

void numberType::getdata(void)
{
    cout<<"How many numbers you want to check?"<<endl;
    cin>>choice;
    cout<<"Enter "<<choice<<" numbers:"<<endl;
    while(choice!=0)
    {
        cin>>num;
        if(num>0)
            countPos++;
        else if(num<0)
            countNeg++;
        else
            countZero++;
        choice--;
    }
}

void numberType::display(void)
{
    cout<<"Positive Counter: "<<countPos<<endl;
    cout<<"Negative Counter: "<<countNeg<<endl;
    cout<<"Zero Counter: "<<countZero<<endl;
}

int main()
{
    numberType n1;
    n1.getdata();
    n1.display();
    return(0);
}
```

```
"C:\Users\ashra\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\CodeBlocks\ques10.exe"
How many numbers you want to check?
8
Enter 8 numbers:
-4
-5
0
0
6
9
-32
45632
Positive Counter: 3
Negative Counter: 3
Zero Counter: 2

Process returned 0 (0x0)  execution time : 21.091 s
Press any key to continue.
```

```
/* Virtual Base Class Demonstration
 * ques11.cpp
 *
 * Created on: 19-Apr-2017
 * Author: shahique
 */
#include<iostream>
using namespace std;
class virtualBase
{
public:
    int i;
};
class derived1:virtual public virtualBase
{
public:
    int j;
};
class derived2:virtual public virtualBase
{
public:
    int k;
};
class derived3:public derived1, public derived2
{
public:
    int sum;
};
int main()
{
    derived3 obj;
    obj.i=10;
    obj.j=20;
    obj.k=30;
    obj.sum=obj.i+obj.j+obj.k;
    cout<<"i= "<<obj.i<<endl;
    cout<<"j= "<<obj.j<<endl;
    cout<<"k= "<<obj.k<<endl;
    cout<<"Sum of above variables is = "<<obj.sum;
    return(0);
}
```

A screenshot of a terminal window titled "C:\Users\ashra\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\CodeBlocks\ques11.exe". The window contains the following text:

```
i= 10
j= 20
k= 30
Sum of above variables is = 60
Process returned 0 (0x0) execution time : 0.000 s
Press any key to continue.
```

```
/* Pointer To An Object Demonstration
 * ques12.cpp
 *
 * Created on: 21-Apr-2017
 * Author: shahique
 */
#include<iostream>
using namespace std;
class bill
{
    int quantity;
    float price,totalAmount;
public:
    getdata(int x, float y)
    {
        quantity=x;
        price=y;
        totalAmount=price*quantity;
    }
    show()
    {
        cout<<"Quantity: "<<quantity<<endl;
        cout<<"Price: "<<price<<endl;
        cout<<"Total Amount: "<<totalAmount<<endl;
    }
};
int main()
{
    bill b1;
    bill *ptr=&b1;
    ptr->getdata(22,20.05);
    (*ptr).show();
    return(0);
}
```

```
C:\Users\ashra\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\CodeBlocks\ques12.exe"
Quantity: 22
Price: 20.05
Total Amount: 441.1

Process returned 0 (0x0)   execution time : 0.016 s
Press any key to continue.
```

```
/* Function Overloading Demonstration
 * ques13.cpp
 *
 * Created on: 21-Apr-2017
 * Author: shahique
 */
#include<iostream>
using namespace std;
class funcOver
{
    int length, breadth;
    float radius;
public:
    void area(int l, int b)
    {
        length=l;
        breadth=b;
        int area=length*breadth;
        cout<<"Area of rectangle= "<<area<<endl;
    }
    void area(float r)
    {
        radius=r;
        float area=3.142*radius*radius;
        cout<<"Area of circle= "<<area<<endl;
    }
};
int main()
{
    funcOver f1;
    f1.area(5,4);
    f1.area(1.5);
    return(0);
}
```

```
"C:\Users\ashra\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\CodeBlocks\ques13.exe"
Area of rectangle= 20
Area of circle= 7.0695
Process returned 0 (0x0) execution time : 0.016 s
Press any key to continue.
```

```
/* Multiple Inheritance Demonstration
 * ques14.cpp
 *
 * Created on: 21-Apr-2017
 * Author: shahique
 */
#include<iostream>
using namespace std;
class M
{
protected:
    int m;
public:
    void get_m(int x)
    {
        m=x;
    }
};
class N
{
protected:
    int n;
public:
    void get_n(int y)
    {
        n=y;
    }
};
class P:public M, public N
{
public:
    void display(void)
    {
        cout<<"m= "<<m<<endl;
        cout<<"n= "<<n<<endl;
        cout<<"m*n= "<<m*n<<endl;
    }
};
int main()
{
    P p1;
    p1.get_m(10);
    p1.get_n(20);
    p1.display();
    return(0);
}
```

A screenshot of a terminal window titled "C:\Users\ashra\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\CodeBlocks\ques14.exe". The window contains the following text:

```
m= 10
n= 20
m*n= 200

Process returned 0 (0x0)   execution time : 0.016 s
Press any key to continue.
```

```
/* Single-Level Inheritance Demonstration
 * ques15.cpp
 *
 * Created on: 21-Apr-2017
 * Author: shahique
 */
#include<iostream>
using namespace std;
class B
{
    int a;      //private; not inheritable
public:
    int b;      //public; inheritable
    void set_ab(void)
    {
        a=5, b=10;
    }
    int get_a(void)
    {
        return a;
    }
    void show_a(void)
    {
        cout<<"a= "<<a<<endl;
    }
};
class D:public B
{
    int c;
public:
    void mul(void)
    {
        c=b*get_a();
    }
    void display(void)
    {
        cout<<"a= "<<get_a()<<endl;
        cout<<"b= "<<b<<endl;
        cout<<"c= "<<c<<endl;
    }
};
int main()
{
    D d1;
    d1.set_ab();
    d1.mul();
    d1.show_a();
    d1.display();

    d1.b=20;
    d1.mul();
    d1.display();
    return(0);
}
```

```
C:\Users\ashra\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\CodeBlocks\ques15.exe"
a= 5
a= 5
b= 10
c= 50
a= 5
b= 20
c= 100

Process returned 0 (0x0)   execution time : 0.000 s
Press any key to continue.
```

```
/* Operator Overloading Demonstration
 * ques15.cpp
 *
 * Created on: 21-Apr-2017
 * Author: shahique
 */
#include<iostream>
using namespace std;
class space
{
    int x, y, z;
public:
    void getdata(int a, int b, int c)
    {
        x=a;
        y=b;
        z=c;
    }
    void display(void)
    {
        cout<<"x= "<<x<<endl;
        cout<<"y= "<<y<<endl;
        cout<<"z= "<<z<<endl;
    }
    void operator-()
    {
        x=-x;
        y=-y;
        z=-z;
    }
};
int main()
{
    space S;
    S.getdata(10, -20, 30);
    cout<<"S: "<<endl;
    S.display();
    -S;
    cout<<"-S: "<<endl;
    S.display();
    return(0);
}
```

```
"C:\Users\ashra\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\CodeBlocks\ques16.exe"
5:
x= 10
y= -20
z= 30
-S:
x= -10
y= 20
z= -30

Process returned 0 (0x0)    execution time : 0.020 s
Press any key to continue.
```

```
/* Friend Function Demonstration
 * ques17.cpp
 *
 * Created on: 21-Apr-2017
 * Author: shahique
 */
#include<iostream>
using namespace std;
class marks
{
private:
    int m1, m2, m3;
public:
    void getdata(void);
    friend int total(marks);
};
void marks::getdata(void)
{
    cout<<"Enter marks in 3 subjects:"<<endl;
    cin>>m1>>m2>>m3;
}
int total(marks m)
{
    int tot=m.m1+m.m2+m.m3;
    return(tot);
}
int main()
{
    marks m;
    m.getdata();
    cout<<"Total:"<<total(m)<<endl;
    return(0);
}
```

```
"C:\Users\ashra\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\CodeBlocks\ques17.exe"
Enter marks in 3 subjects:
93
85
96
Total:274
Process returned 0 (0x0)  execution time : 5.882 s
Press any key to continue.
```

```
/* Templates Demonstration
 * ques18.cpp
 *
 * Created on: 21-Apr-2017
 * Author: shahique
 */
#include<iostream>
using namespace std;
template<class T>
void swap(T &x, T &y)
{
    T temp=x;
    x=y;
    y=temp;
}
void fun(int m, int n, float a, float b)
{
    cout<<"m and n before swap: "<<m<<" "<<n<<endl;
    swap(m,n);
    cout<<"m and n after swap: "<<m<<" "<<n<<endl;
    cout<<"a and b before swap: "<<a<<" "<<b<<endl;
    swap(a,b);
    cout<<"a and b after swap: "<<a<<" "<<b<<endl;
}
int main()
{
    fun(100,200,11.22,33.44);
    return(0);
}
```

```
"C:\Users\ashra\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\CodeBlocks\test.exe"
m and n before swap: 100 200
m and n after swap: 200 100
a and b before swap: 11.22 33.44
a and b after swap: 33.44 11.22

Process returned 0 (0x0)  execution time : 0.031 s
Press any key to continue.
```

```
/* Constructor Demonstration
 * ques19.cpp
 *
 * Created on: 21-Apr-2017
 * Author: shahique
 */
#include<iostream>
using namespace std;
class Point
{
    int x,y;
public:
    Point(int a, int b)
    {
        x=a;
        y=b;
    }
    void display()
    {
        cout<<" ("<<x<<","<<y<<") "<<endl;
    }
};
int main()
{
    Point p1(1,1);
    Point p2(5,10);
    cout<<"Point p1 = ";
    p1.display();
    cout<<"Point p2 = ";
    p2.display();
    return(0);
}
```

```
"C:\Users\ashra\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\CodeBlocks\ques19.exe"
Point p1 = (1,1)
Point p2 = (5,10)

Process returned 0 (0x0)    execution time : 0.016 s
Press any key to continue.
```

```
/* Multi-level Inheritance Demonstration
 * ques20.cpp
 *
 * Created on: 21-Apr-2017
 * Author: shahique
 */
#include<iostream>
using namespace std;
class student
{
protected:
    int roll_number;
public:
    void get_number(int);
    void put_number(void);
};
void student::get_number(int a)
{
    roll_number=a;
}
void student::put_number()
{
    cout<<"Roll Number: "<<roll_number<<endl;
}
class test:public student
{
protected:
    float sub1, sub2;
public:
    void get_marks(float, float);
    void put_marks(void);
};
void test::get_marks(float x, float y)
{
    sub1=x;
    sub2=y;
}
void test::put_marks()
{
    cout<<"Marks in SUB1 = "<<sub1<<endl;
    cout<<"Marks in SUB2 = "<<sub2<<endl;
}
class result:public test
{
    float total;
public:
    void display(void);
};
void result::display(void)
{
    total=sub1+sub2;
    put_number();
    put_marks();
    cout<<"Total = "<<total<<endl;
}
int main()
{
    result student1;
    student1.get_number(111);
    student1.get_marks(75.0,59.55);
    student1.display();
    return(0);
}
```

```
C:\Users\ashra\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\CodeBlocks\ques20.exe"
Roll Number: 111
Marks in SUB1 = 75
Marks in SUB2 = 59.55
Total = 134.55

Process returned 0 (0x0) execution time : 0.085 s
Press any key to continue.
```