Problem Solving using c and c++

Lab Assignment 1

Patil Amit Gurusidhappa
19104004
B11

1. Write a C function that inserts a string into another string at a specified position. It returns a positive number if it is successful or zero if it has any problem, such as an insertion location greater than the length of the receiving string. The first parameter is the receiving string, the second parameter is the string to be inserted, and the third parameter is the insertion (index) position in the first string.

```
#include <iostream>
#include <string>

using namespace std;

void insertFn(string str1, string str2)
{

    str1.insert(2, str2);
    cout << str1;
}

// Driver code
int main()
{
    string str1("amit");
    string str2("ok");
    insertFn(str1, str2);

    return 0;
}
```

Output

```
_solving_lab\LAB1\" ; if ($?) { g++ Q1.cpp -o Q1 }
; if ($?) { .\Q1 }
amokit
```

2. Create a structure fraction consisting of two fields, namely numerator and denominator.Write a C function that compares two fraction structures. If the fractions are equal, it returns zero. If the fraction in first parameter is less than fraction in the second parameter,it returns a negative number. Otherwise, it returns a positive number.

```cpp
#include <bits/stdc++.h>

using namespace std;
struct fraction
{
    int z;
    int n;
};
int main()
{
    fraction f1;
    fraction f2;
    f1.z = 10;
    f1.n = 5;

    f2.z = 4;
    f2.n = 1;
    double f1val = f1.z / f1.n;
    double f2val = f2.z / f2.n;

    if (f1val > f2val)
    {
        cout << 1;
    }
    else if (f1val < f2val)
    {
        cout << -1;
    }
```

```
    else
    {
        cout << 0;
    }
}
```

Output

```
PS E:\Work\JIIT\sem_6\JIIT-SEM-6\Problem_solving_la
b\LAB1> cd "e:\Work\JIIT\sem_6\JIIT-SEM-6\Problem_s
olving_lab\LAB1\" ; if ($?) { g++ q2.cpp -o q2 } ;
if ($?) { .\q2 }
-1
```

3. Write a C++ program with the two alternate functions specified below, each of which simply triples the variable count defined in main. Then compare and contrast the two approaches. These two functions are

i. Function tripleByValue that passes a copy of count by value, triples the copy and returns the new value.

ii. Function tripleByReference that passes count by reference via a reference parameter and triples the original value of count through its alias (i.e., the reference parameter)

```
#include <bits/stdc++.h>
using namespace std;

int tripleByValue(int n)
{
    return n * 3;
}
void tripleByRef(int &n)
{
    n = n * 3;
}
int main()
{
    int n = 10;
    cout << tripleByValue(n) << endl;
    tripleByRef(n);
```

```
    cout << n << endl;
}
```

Output

```
PS E:\Work\JIIT\sem_6\JIIT-SEM-6\Problem_solving_la
b\LAB1> cd "e:\Work\JIIT\sem_6\JIIT-SEM-6\Problem_s
olving_lab\LAB1\" ; if ($?) { g++ q3.cpp -o q3 } ;
if ($?) { .\q3 }
30
30
```

4. Write a C++ program to overload a function with default Arguments.

```
#include <iostream>
using namespace std;

int sum(int x, int y, int z = 0, int w = 0)
{
    return (x + y + z + w);
}
int sum(int x, int y, float z, float w = 0.0)
{
    return (x + y + z + w);
}
int main()
{
    cout << sum(10, 15) << endl;
    cout << sum(10, 15, 25) << endl;
    cout << sum(10, 15, 25, 30) << endl;
    return 0;
}
```

Output

```
PS E:\Work\JIIT\sem_6\JIIT-SEM-6\Problem_solving_la
b\LAB1> cd "e:\Work\JIIT\sem_6\JIIT-SEM-6\Problem_s
olving_lab\LAB1\" ; if ($?) { g++ q4.cpp -o q4 } ;
if ($?) { .\q4 }
25
50
80
```

5. Write a C++ program to create a class Rectangle that has floating point data members'
length and width. The class has member functions, void setlength(float) to set the length data member, void setwidth(float) to set the width data member, float perimeter() to calculate and return the perimeter of the rectangle, float area() to calculate and return the area of the rectangle, void show() to display the length and width of the rectangle, int sameArea(Rectangle) that has one parameter of type Rectangle. The sameArea function returns 1 if the two Rectangles have the same area and returns 0 if they don't.
i. Write the definitions for each of the above member functions.
ii. Write a main function to create two rectangle objects. Set the length and width of the first rectangle to 5 and 2.5. Set the length and width of the second rectangle to 5 and 18.9. Display each rectangle and its area and perimeter.
iii. Check whether the two Rectangles have the same area and print a message indicating the result. Set the length and width of the first rectangle to 15 and 6.3. Display each Rectangle and its area and perimeter again. Again, check whether the two Rectangles have the same area and print a message indicating the result

```cpp
#include <bits/stdc++.h>
using namespace std;

class Rectangle
{
    double l, w;

public:
    void setLength(double len)
    {
        l = len;
```

```
    }
    void setWindth(double width)
    {
        w = width;
    }
    float perimeter()
    {
        return 2 * (l + w);
    }
    float area()
    {
        return l * w;
    }
    void show()
    {
        cout << "len " << l << " width " << w << endl;
    }
    int sameArea(Rectangle r)
    {
        if (r.area() == area())
        {
            return 1;
        }
        else
        {
            return 0;
        }
    }
};
int main()
{
    Rectangle r1, r2;
    r1.setLength(5);
    r1.setWindth(2.5);
    r2.setLength(5);
    r2.setWindth(18.9);
```

```
    cout << " R1 "
         << " area " << r1.area() << " Perimerter " << r1.perimeter()
<< endl;

    cout << " R2 "
         << " area " << r2.area() << " Perimerter " << r2.perimeter()
<< endl;

    // Que iii here

    cout << "same area " << r1.sameArea(r2) << endl;
    r1.setLength(5);
    r1.setWindth(18.9);
    cout << "same area " << r1.sameArea(r2) << endl;
}
```

Output

```
PS E:\Work\JIIT\sem_6\JIIT-SEM-6\Problem_solving_la
b\LAB1> cd "e:\Work\JIIT\sem_6\JIIT-SEM-6\Problem_s
olving_lab\LAB1\" ; if ($?) { g++ q5.cpp -o q5 } ;
if ($?) { .\q5 }
 R1  area 12.5 Perimerter 15
 R2  area 94.5 Perimerter 47.8
same area 0
same area 1
```

6. Write a C++ program to create a class ZooAnimal and define its constructor function. The function has 4 parameters, namely a character string followed by three integer parameters. In the constructor function dynamically allocate the name field (20 characters), copy the character string parameter into the name field, and then assign the three integer parameters to cageNumber, weightDate, and weight respectively.

```
#include <bits/stdc++.h>
using namespace std;

class ZooAnimal
```

```
{

public:
    int cageNumber;
    int weightDate;
    int weight;
    char *str;
    ZooAnimal(char str[], int cg, int wd, int w)
    {
        this->str = new char[20];
        strcpy(this->str, str);

        cageNumber = cg;
        weightDate = wd;
        weight = w;
    }
};

int main()
{
}
```

7. Write a C++ program to overload new, delete, >>, and << operators.

```
#include <bits/stdc++.h>
using namespace std;
void *operator new(size_t size)
{
    cout << "Overloading new operator";
    void *p = ::operator new(size);
    return p;
}

void operator delete(void *p)
{
    cout << "Overloading delete";
    free(p);
```

```
}

class Person
{
private:
    string name;

public:
    friend ostream &operator<<(ostream &output, const Person &p)
    {
        output << "Person's Name is " << p.name;
        return output;
    }
    friend istream &operator>>(istream &input, Person &p)
    {
        input >> p.name;
        return input;
    }
};

int main()
{
    Person p;
    cin >> p;
    cout << p;
}
```

Output

```
PS E:\Work\JIIT\sem_6\JIIT-SEM-6\Problem_solving_la
b\LAB1> cd "e:\Work\JIIT\sem_6\JIIT-SEM-6\Problem_s
olving_lab\LAB1\" ; if ($?) { g++ q7.cpp -o q7 } ;
if ($?) { .\q7 }
amit
Person's Name is amit
```