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COSC 120

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4 December 2020

Lab 10 (13) classes

13.1

1.

```
D:\downloads\Lab_export(6)\Lab13\square.exe
What is the length of the side of a square
8
The area is 64
The perimeter of the square is 32

Process returned 0 (0x0)   execution time : 2.383 s
Press any key to continue.
```

2.

```
D:\downloads\Lab_export(6)\Lab13\square.exe
hat is the length of the side of a square
8
he area is 64
he area of box1 is 81
he perimeter of the square is 32
he perimeter of box1 is 36

rocess returned 0 (0x0)   execution time : 0.632 s
ress any key to continue.
```

Source Code:

// This program declares the Square class and uses member functions to find

// the perimeter and area of the square

```
// PLACE YOUR NAME HERE


#include <iostream>

using namespace std;


// FILL IN THE CODE TO DECLARE A CLASS CALLED Square. TO DO THIS SEE

// THE IMPLEMENTATION SECTION.

class Square

{

private:

    int side;

public:

    Square()

    {

        side=1;



    }

    //constructor

    Square(float size)

    {

        side=size;

    }
```

```
    ~Square();
    //destructor
    void setSide(float length);
    float findArea();
    float findPerimeter();
};
Square::~Square()
{

}

int main()
{
    Square box; // box is defined as an object of the Square class
    float size;     // size contains the length of a side of the square
    float size1=9;
    float area;
    float area1;
    float perimeter;
    float perimeter1;
    float side=0;
```

```
    // FILL IN THE CLIENT CODE THAT WILL ASK THE USER FOR THE LENGTH OF
THE
    // SIDE OF THE SQUARE. (This is stored in size)
    cout<<"What is the length of the side of a square"<<endl;
    cin>>size;
    // FILL IN THE CODE THAT CALLS SetSide.
    Square Box1( size1);
    box.setSide(size);
    //set box side value



    // FILL IN THE CODE THAT WILL RETURN THE AREA FROM A CALL TO A
FUNCTION
    // AND PRINT OUT THE AREA TO THE SCREEN.
    area=box.findArea();
    area1=Box1.findArea();
    cout<<"The area is "<<area<<endl;
    cout<<"The area of box1 is "<<area1<<endl;

    // FILL IN THE CODE THAT WILL RETURN THE PERIMETER FROM A CALL TO A
    // FUNCTION AND PRINT OUT THAT VALUE TO THE SCREEN.
    perimeter=box.findPerimeter();
    perimeter1=Box1.findPerimeter();
```

```
    cout<<"The perimeter of the square is "<<perimeter<<endl;
    cout<<"The perimeter of box1 is "<<perimeter1<<endl;



    return 0;
}


// ____________________________________________________________
//
// Implementation section       Member function implementation


//**************************************************
//  setSide
//
//  task: This procedure takes the length of a side and
//                places it in the appropriate member data
//  data in: length of a side
//**************************************************


void Square::setSide(float length)
{
    side = length;
}
```

```
//*************************************************
//        findArea
//
//  task:       This finds the area of a square
//  data in:       none (uses value of data member side)
//  data returned: area of square
//**************************************************

float Square::findArea()
{
   return side * side;
}

//*************************************************
//        findPerimeter
//
//  task:       This finds the perimeter of a square
//  data in:       none (uses value of data member side)
//  data returned: perimeter of square
//**************************************************

float Square::findPerimeter()
```

```
{
    return (4 * side);
}
```

13.2

1.

```
D:\downloads\Lab_export(6)\Lab13\circles.exe
The radius of the circle is 8
The center of the circle is (9,10)
The area of the circle is 200.96
The circumference of the circle is 50.24

Process returned 0 (0x0)   execution time : 0.226 s
Press any key to continue.
```

2

```
D:\downloads\Lab_export(6)\Lab13\circles.exe
The radius of the circle is 2
The center of the circle is (0,0)
The area of the circle is 12.56
The circumference of the circle is 12.56

The radius of the circle is 1
The center of the circle is (0,0)
The area of the circle is 3.14
The circumference of the circle is 6.28

Process returned 0 (0x0)   execution time : 0.131 s
Press any key to continue.
```

3

```
D:\downloads\Lab_export(6)\Lab13\circles.exe
The radius of the circle is 2
The center of the circle is (0,0)
The area of the circle is 12.56
The circumference of the circle is 12.56

The radius of the circle is 1
The center of the circle is (0,0)
The area of the circle is 3.14
The circumference of the circle is 6.28

The radius of the circle is 1
The center of the circle is (15,16)
The area of the circle is 3.14
The circumference of the circle is 6.28

Process returned 0 (0x0)   execution time : 1.730 s
Press any key to continue.
```

4

```
D:\downloads\Lab_export(6)\Lab13\circles.exe
The radius of the circle is 2
The center of the circle is (0,0)
The area of the circle is 12.56
The circumference of the circle is 12.56

The radius of the circle is 1
The center of the circle is (0,0)
The area of the circle is 3.14
The circumference of the circle is 6.28

The radius of the circle is 1
The center of the circle is (15,16)
The area of the circle is 3.14
The circumference of the circle is 6.28
This concludes the circle class
This concludes the circle class
This concludes the circle class

Process returned 0 (0x0)   execution time : 0.423 s
Press any key to continue.
```

It does it 3 times because there are 3 instances created in that moment

Source Code

```
#include <iostream>

#include <iomanip>

using namespace std;


// ____________________________________________________________________

//

// This program declares a class for a circle that will have

// member functions that set the center, find the area, find

// the circumference and display these attributes.

// The program as written does not allow the user to input data, but

// rather has the radii and center coordinates of the circles

// (spheres in the program) initialized at definition or set by a function.


// class declaration section      (header file)


// PLACE YOUR NAME HERE


class Circles

{

public:

    void setCenter(int x, int y);

    double findArea();

    double findCircumference();
```

```
    void printCircleStats();
    // This outputs the radius and center of the circle.
    float r;
    Circles(float r);       // Constructor
    // Circles(default);
    Cicles(float r=1){
            radius=r;
}
// Default constructor
    ~Circles();
private:
    float radius;
    int    center_x;
    int    center_y;
};

const double PI = 3.14;

// Client section

int main()
{
    Circles sphere(2);
```

```
// sphere.setCenter(0, 0);
sphere.printCircleStats();

cout << "The area of the circle is " << sphere.findArea() << endl;
cout << "The circumference of the circle is "
    << sphere.findCircumference() << endl;
cout<<endl;
Circles sphere1(1);
//sphere1.setCenter(0, 0);
sphere1.printCircleStats();

cout << "The area of the circle is " << sphere1.findArea() << endl;
cout << "The circumference of the circle is "
    << sphere1.findCircumference() << endl;
cout<<endl;

Circles sphere3(1);
sphere3.setCenter(15, 16);
sphere3.printCircleStats();

cout << "The area of the circle is " << sphere3.findArea() << endl;
cout << "The circumference of the circle is "
    << sphere3.findCircumference() << endl;
```

```
    return 0;
}

// ____________________________________________________________________
//
// Implementation section       Member function implementation



Circles::Circles(float r)
{
    radius=r;
    center_x=0;
    center_y=0;
    //default center is 0,0

}

// Fill in the code to implement the non-default constructor

// Fill in the code to implement the findArea member function
double Circles::findArea()
{
```

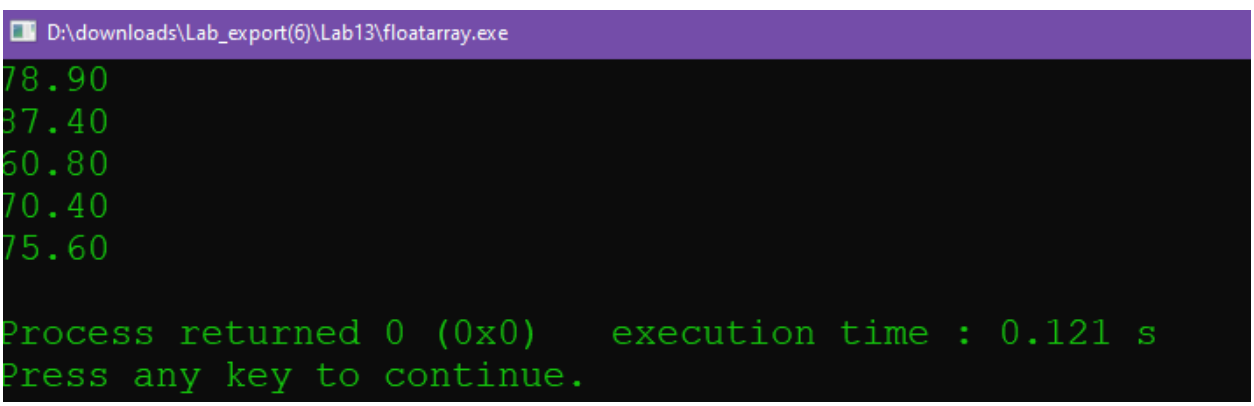
```
    double area=PI*(radius*radius);
    return area;
}
double Circles::findCircumference()
{
    double circ=2*PI*radius;
    return circ;
}
Circles::~Circles()
{
    cout<<"This concludes the circle class"<<endl;
}



// Fill in the code to implement the findCircumference member function


void Circles::printCircleStats()
// This procedure prints out the radius and center coordinates of the circle
// object that calls it.
{
    cout << "The radius of the circle is " << radius << endl;
    cout << "The center of the circle is (" << center_x
        << "," << center_y << ")" << endl;
```

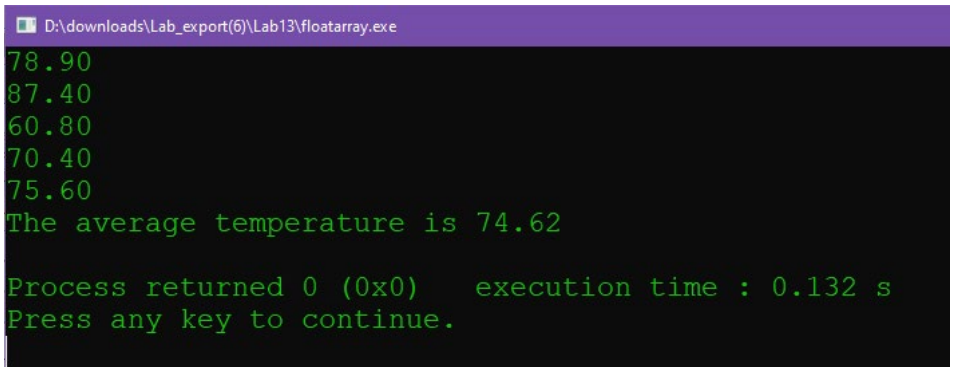
```
}

void Circles::setCenter(int x, int y)
// This procedure will take the coordinates of the center of the circle from
// the user and place them in the appropriate member data.
{
    center_x = x;
    center_y = y;
}
```

13.3

1. It is declared constant because that does not allow any of its members to be changed without resulting in a compiler error

2.



3. 

Soruce Code:

```
// This program reads floating point data from a data file and places those

// values into the private data member called values (a floating point array)

// of the FloatList class. Those values are then printed to the screen.

// The input is done by a member function called GetList. The output

// is done by a member function called PrintList. The amount of data read in

// is stored in the private data member called length. The member function

// GetList is called first so that length can be initialized to zero.


// PLACE YOUR NAME HERE

#include <iostream>

#include <fstream>

#include <iomanip>

using namespace std;


const int MAX_LENGTH = 50;                    // MAX_LENGTH contains the maximum length of

our list

class FloatList                               // Declares a class that contains an array of
```

```
{
public:
    void getList(ifstream& tempData);// Member function that gets data from a file
    void printList() const;                    // Member function that prints data from that
    void printAvg();
    // file to the screen.

    FloatList();                               // constructor that sets length to 0.
    ~FloatList();                                      // destructor

private:
    int length;                                        //        Holds the number of elements in the array
    float values[MAX_LENGTH];      //        The array of values

};

int main()
{
    ifstream tempData; // Defines a data file

    // Fill in the code to define an object called list of the class FloatList
    FloatList list;
```

```
    cout << fixed << showpoint;

    cout << setprecision(2);

    tempData.open("temperatures.txt");

    // Fill in the code that calls the getList function.
    list.getList(tempData);

    // Fill in the code that calls the printList function.
    list.printList();
    list.printAvg();

    return 0;
}



void FloatList::getList(ifstream& tempData)
{
    length=5;
    float input;
```

```
    for (int i=0; i<length; i++)
    {
        tempData>>input;
        values[i]=input;
    }

}
// Fill in the entire code for the getList function
// The getList function reads the data values from a data file
// into the values array of the class FloatList
void FloatList::printList() const
{
    for (int i=0; i<length; i++)
    {

        cout<<values[i]<<endl;
    }

}

// Fill in the entire code for the printList function
// The printList function prints to the screen the data in
// the values array of the class FloatList
```

```
void FloatList::printAvg()
{
    float total=0;
    float avg=0;
    for (int i=0; i<length; i++)
    {

        total+=values[i];
    }
    avg=total/length;
    cout<<"The average temperature is "<<avg<<endl;

}
FloatList::FloatList()
{
    length=0;
    // Fill in the code to complete this constructor that
    // sets the private data member length to 0
}

FloatList::~FloatList()
{
}
```

13.4

1

```
D:\downloads\Lab_export(6)\Lab13\inventory.exe
Item number 986 has 8 items in stock
Item number 432 has 24 items in stock
Item number 132 has 100 items in stock
Item number 123 has 89 items in stock
Item number 329 has 50 items in stock
Item number 503 has 30 items in stock
Item number 783 has 78 items in stock
Item number 822 has 32 items in stock
Item number 233 has 56 items in stock
Item number 322 has 74 items in stock

Process returned 0 (0x0)   execution time : 0.222 s
Press any key to continue.
```

Source Code:

```
#include <iostream>

#include <fstream>


#include <string>

using namespace std;


// This program declares a class called Inventory that has itemnNumber (which

// contains the id number of a product) and numOfItem (which contains the

// quantity on hand of the corresponding product) as private data members.

// The program will read these values from a file and store them in an

// array of objects (of type Inventory). It will then print these values
```

```
// to the screen.

// PLACE YOUR NAME HERE

// Example: Given the following data file:
//                    986 8
//                    432 24
//
// This program reads these values into an array of objects and prints the
// following:
//                    Item number 986 has 8 items in stock
//                    Item number 432 has 24 items in stock

const int NUMOFPROD = 10;                    // This holds the number of products a store sells

class Inventory
{
public:
    void getId(int item);                    // This puts item in the private data member
    // itemNumber of the object that calls it.

    void getAmount(int num);  // This puts num in the private data member
    // numOfItem of the object that calls it.
```

```
    void display();                                 // This prints to the screen
    // the value of itemNumber and numOfItem of the
    // object that calls it.
    int return_id();
    int return_amnt();
    //return the values



private:
    int    itemNumber;                              // This is an id number of the product
    int    numOfItem;                               // This is the number of items in stock


};
void Inventory::display()
{


    cout<<"Item number "<<return_id()<<" has "<<return_amnt()<<" items in stock"<<endl;
}
void Inventory::getId(int item)
//converts to private
{
    itemNumber=item;
```

```
}

void Inventory::getAmount(int num)
//converts to private
{
    numOfItem=num;
}
int Inventory::return_id()
{
    return itemNumber;
}
int Inventory::return_amnt()
{
    return numOfItem;


}
int main()
{
    ifstream infile;        // Input file to read values into array
    infile.open("Inventory.dat");


    // Fill in the code that defines an array of objects of class Inventory
    // called products. The array should be of size NUMOFPROD
```

```
    Inventory inv_array[NUMOFPROD];
    int pos; // loop counter
    int id;                    // variable holding the id number
    int total;      // variable holding the total for each id number

    //int getId();
    // int getAmount();

    for ( pos=0; pos<NUMOFPROD; pos++)
    {

        infile>>id;
        infile>>total;
        inv_array[pos].getId(id);
        inv_array[pos].getAmount(total);
        inv_array[pos].display();
    }

// Fill in the code that will read inventory numbers and number of items
// from a file into the array of objects. There should be calls to both
// getId and getAmount member functions somewhere in this code.
// Example: products[pos].getId(id); will be somewhere in this code
```

// Fill in the code to print out the values (itemNumber and numOfItem) for

// each object in the array products.

// This should be done by calling the member function display within a loop

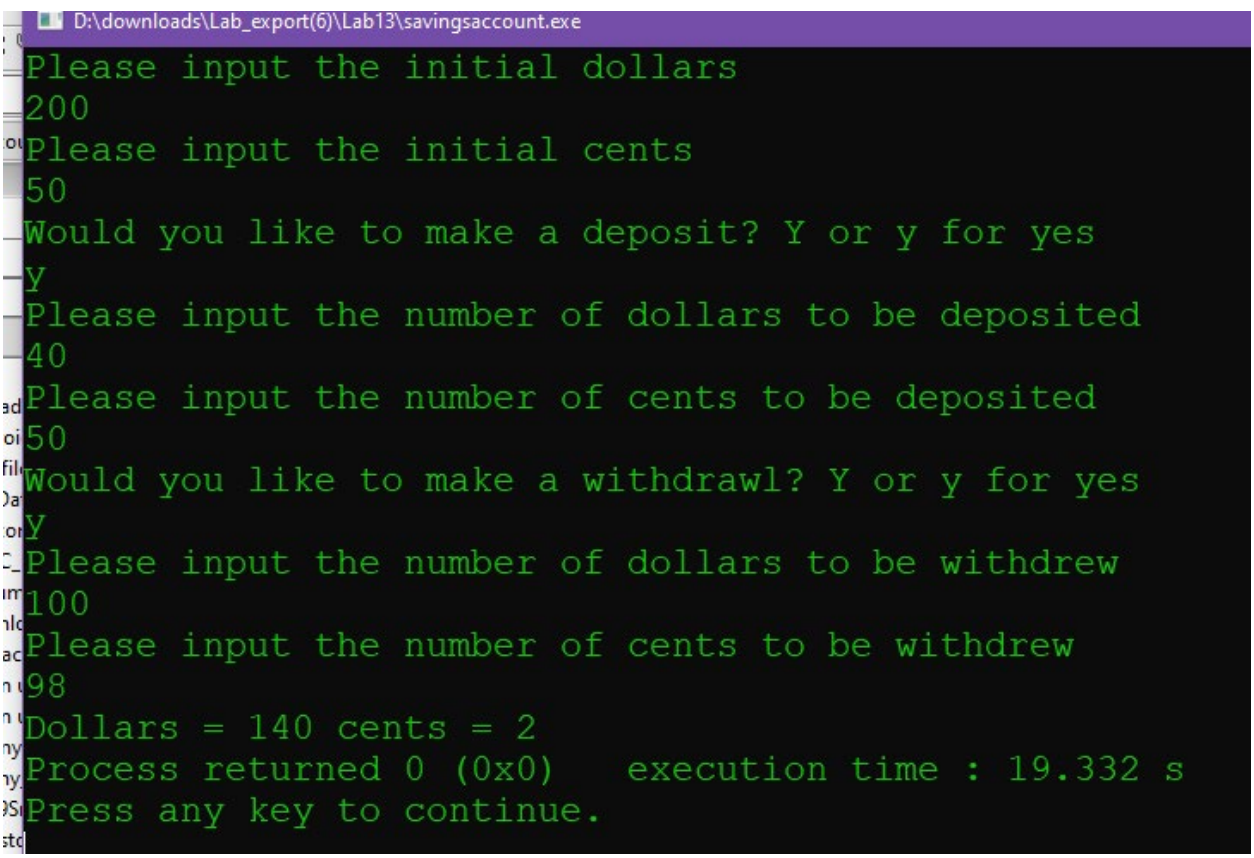
```
    return 0;
}
```

// Write the implementations for all the member functions of the class.

13.5

Exercise 1

1. 2.



Exercise 2

```
D:\downloads\Lab_export(6)\Lab13\savingsaccount.exe
Please input the initial dollars
400
Please input the initial cents
600
Would you like to make a deposit? Y or y for yes
n
Would you like to make a withdrawl? Y or y for yes
y
Please input the number of dollars to be withdrew
65
Please input the number of cents to be withdrew
33
Dollars = 340 cents = 67
Would you like to make a deposit? Y or y for yes
y
Please input the number of dollars to be deposited
100
Please input the number of cents to be deposited
23
Would you like to make a withdrawl? Y or y for yes
y
Please input the number of dollars to be withdrew
76
Please input the number of cents to be withdrew
136
Dollars = 473 cents = 52

Process returned 0 (0x0)   execution time : 32.569 s
Press any key to continue.
```

Source Code:

```
#include <iostream>

using namespace std;



class SavingsAccount

{

public:
```

```
    void deposit();
    void withdrawl();
    void show_balance();
    void InitialValues();
    SavingsAccount(int doll=0,int cent=0)
    //default constructor
    {
        dollars=doll;
        cents=cent;
    }
private:
    int dollars=0;
    int cents=0;

};

void SavingsAccount::deposit()
{
    char choice;
    int input_dollars;
    int input_cents;
    cout<<"Would you like to make a deposit? Y or y for yes"<<endl;
    cin>>choice;
```

```
    if((choice=='Y') ||(choice=='y'))
    {
        cout<<"Please input the number of dollars to be deposited"<<endl;
        cin>>input_dollars;
        cout<<"Please input the number of cents to be deposited"<<endl;
        cin>>input_cents;
        dollars+=input_dollars;
        cents+=input_cents;

    }
    else
    {

    }

}
void SavingsAccount::withdrawl()
{
    //withdrawl
    char choice;
    int withd_dollars;
    int withd_cents;
    cout<<"Would you like to make a withdrawl? Y or y for yes"<<endl;
```

```
    cin>>choice;
    if((choice=='Y') ||(choice=='y'))
    {
        cout<<"Please input the number of dollars to be withdrew"<<endl;
        cin>>withd_dollars;
        cout<<"Please input the number of cents to be withdrew"<<endl;
        cin>>withd_cents;
        if (withd_cents>cents)
        {
            //transfer a dollar to cents
            dollars-=1;
            cents+=100;
        }
        dollars-=withd_dollars;
        cents-=withd_cents;
        //update values
    }
    else
    {


    }


}
```

```
void SavingsAccount::InitialValues()
{
    cout<<"Please input the initial dollars"<<endl;
    cin>>dollars;
    cout<<"Please input the initial cents"<<endl;
    cin>>cents;
    //set initial values


}
void SavingsAccount::show_balance()
{
    while (cents>100)
    {
        //udpate dollars and cents
        cents-=100;
        dollars+=1;
    }
    cout<<"Dollars = "<<dollars<<" cents = "<<cents<<endl;
    //show dollars and cents



}
```

```
int main()
{
    SavingsAccount Bank1;
    SavingsAccount Bank2(450,65);
    //create bank 1
    Bank1.InitialValues();
    Bank1.deposit();
    Bank1.withdrawl();
    Bank1.show_balance();
    // Bank2.InitialValues();
    Bank2.deposit();
    Bank2.withdrawl();
    Bank2.show_balance();




    return 0;
}
```