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COSC 120-751

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Lab 6.2

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Lab 6.2.1

Source Code

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

const double PI = 3.14;
const double RATE = 0.25;

void findArea(float, float&);
void findCircumference(float, float&);

int main()
{
	cout << fixed << showpoint << setprecision(2);
	float radius = 12;

	cout << " Main function outer block" << endl;
	cout << " PI and radius are active here" << endl << endl;

	{
		float area;
```

```
        cout << "Main function first inner block" << endl;
        cout << "Radius and area are active here" << endl << endl;

        findArea(radius, area);

        cout << "The radius = " << radius << endl;
        cout << "The area = " << area << endl << endl;
    }

    {
        float radius = 10;
        float circumference;

        cout << "Main function second inner block" << endl;
        cout << "Radius and circumference are active here" << endl << endl;

        findCircumference(radius, circumference);

        cout << "The radius = " << radius << endl;
        cout << "The circumference = " << circumference << endl << endl;
    }

    cout << "Main function after all the calls" << endl;
    cout << "Radius is active here" << endl << endl;

    return 0;
}

//      ********************************************************************
```

```
//        findArea
//
//        task:      This function finds the area of a circle given its radius
//        data in:  radius of a circle
//        data out: answer (which alters the corresponding actual parameter)
//
//        ***************************************************************

void findArea(float rad, float& answer)
{
        cout << "AREA FUNCTION" << endl << endl;
        cout << "Radius and PI are active here" << endl << endl;
   answer = PI * (rad * rad);
}

//        ***************************************************************************
//        findCircumference
//
//        task:      This function finds the circumference of a circle given its radius
//        data in:  radius of a circle
//        data out: distance (which alters the corresponding actual parameter)
//
//        ***************************************************************************

void findCircumference(float length, float& distance)
{
        cout << "CIRCUMFERENCE FUNCTION" << endl << endl;
        cout << "PI and radius are active here" << endl << endl;
   distance = 2 * (PI * length);
```

}

****

Output

Main function outer block

PI and radius are active here

Main function first inner block

Radius and area are active here

AREA FUNCTION

Radius and PI are active here

The radius = 12.00

The area = 452.16

Main function second inner block

Radius and circumference are active here

CIRCUMFERENCE FUNCTION

PI and radius are active here

The radius = 10.00

The circumference = 62.80

Main function after all the calls

Radius is active here

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Question Answer

Exercise 1 wanted to know the scope of each identifier. Global identifiers are const double PI, const double RATE, void findArea and void, findCircumference. Identifiers in main block are float radius. Identifiers in main inner block 1 are float area. Identifiers in main inner block 2 are float radius and float circumference. Idenfitiers in findArea function body block are float rad and float& answer.

Exercise 2 wanted to fill in the bold sections in all caps with each identifier.

Exercise 3 wanted to fill in the comments with the code to complete the program.

Exercise 4 wanted to know what the expected output will be. It will be:

Main function outer block

PI and radius are active here

Main function first inner block

Radius and area are active here

AREA FUNCTION

Radius and PI are active here

The radius = 12.00

The area = 452.16

Main function second inner block

Radius and circumference are active here

CIRCUMFERENCE FUNCTION

PI and radius are active here

The radius = 10.00

The circumference = 62.80

Main function after all the calls

Radius is active here

Exercise 5 wanted to run the program and see if the output matched what it should be.

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Lab 6.2.2

Source Code

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

void normalizeMoney(float& dollars, int cents = 150);

int main()
{
	int cents;
	float dollars;

	cout << setprecision(2) << fixed << showpoint;

	cents = 95;

	cout << "\n We will now add 95 cents to our dollar total\n";

	normalizeMoney(dollars, cents);

	cout << "Converting cents to dollars resulted in " << dollars << " dollars\n";
```

```
	cout << "\n We will now add 193 cents to our dollar total\n";

	cents += 193;

	normalizeMoney(dollars, cents);

	cout << "Converting cents to dollars resulted in " << dollars << " dollars\n";

	cout << "\n We will now add the default value to our dollar total\n";

	normalizeMoney(dollars, cents);

	cout << "Converting cents to dollars resulted in " << dollars << " dollars\n";

	return 0;
}

//*************************************************************************
//	normalizeMoney
//
//	task:	This function is given a value in cents. It will convert cents
//		to dollars and cents which is stored in a local variable called
//		total which is sent back to the calling function through the
//		parameter dollars. It will keep a running total of all the money
//		processed in a local static variable called sum.
//
//	data in:  cents which is an integer
//	data out: dollars (which alters the corresponding actual parameter)
```

```
//
//*****************************************************************************

void normalizeMoney(float& dollars, int cents)
{
        float total = 0;

        static int sum = 0.0;

   dollars = cents / 100;

        total = total + dollars;
        sum = sum + dollars;

        cout << "We have added another $" << dollars << "         to our total" << endl;
        cout << "Our total so far is         $" << sum << endl;

        cout << "The value of our local variable total is $" << total << endl;
}
*****************************************************************************
```

Output

```
We will now add 95 cents to our dollar total
We have added another $0.00     to our total
Our total so far is     $0
The value of our local variable total is $0.00
Converting cents to dollars resulted in 0.00 dollars

 We will now add 193 cents to our dollar total
We have added another $2.00     to our total
```

Our total so far is $2

The value of our local variable total is $2.00

Converting cents to dollars resulted in 2.00 dollars

We will now add the default value to our dollar total

We have added another $2.00 to our total

Our total so far is $4

The value of our local variable total is $2.00

Converting cents to dollars resulted in 2.00 dollars

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Question Answer

Exercise 1 wanted to know what the output of the code will be. The predicted output will be:

We will now add 95 cents to our dollar total

We have added another $0.00 to our total

Our total so far is $0

The value of our local variable total is $0.00

Converting cents to dollars resulted in 0.00 dollars

We will now add 193 cents to our dollar total

We have added another $2.00 to our total

Our total so far is $2

The value of our local variable total is $2.00

Converting cents to dollars resulted in 2.00 dollars

We will now add the default value to our dollar total

We have added another $2.00 to our total

Our total so far is $4

The value of our local variable total is $2.00

Converting cents to dollars resulted in 2.00 dollars

Exercise 2 wanted to complete the missing code in the function.

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Lab 6.2.3

Source Code

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

const double CONVERTEURO = 1.06;
const double CONVERTPESO = 9.73;
const double CONVERTYEN = 124.35;

void convertMulti(float dollars, float& euros, float& pesos);
void convertMulti(float dollars, float& euros, float& pesos, float& yen);
float convertToYen(float dollars);
float convertToEuros(float dollars);
float convertToPesos(float dollars);

int main()
{
        float dollars;
        float euros;
        float pesos;
        float yen;

        cout << fixed << showpoint << setprecision(2);
```

```
        cout << "Please input the amount of American Dollars you want converted "
                << endl;
        cout << "to euros and pesos" << endl;
        cin >> dollars;

   convertMulti(dollars, euros, pesos);

        cout << "$" << dollars << " converts into " << euros << " euros and " << pesos << " pesos." <<
endl << endl;

        cout << "Please input the amount of American Dollars you want converted\n";
        cout << "to euros, pesos and yen" << endl;
        cin >> dollars;

   convertMulti(dollars, euros, pesos, yen);

   cout << "$" << dollars << " converts into " << euros << " euros, " << pesos << "pesos, and " << yen << "
yen." << endl << endl;
        cout << "Please input the amount of American Dollars you want converted\n";
        cout << "to yen" << endl;
        cin >> dollars;

   yen = convertToYen(dollars);
   cout << "$" << dollars << " converts into " << yen << " yen." << endl << endl;

        cout << "Please input the amount of American Dollars you want converted\n";
        cout << " to euros" << endl;
        cin >> dollars;
```

```
   euros = convertToEuros(dollars);
   cout << "$" << dollars << " converts into " << euros << " euros." << endl << endl;

         cout << "Please input the amount of American Dollars you want converted\n";
         cout << " to pesos " << endl;
         cin >> dollars;

   pesos = convertToPesos(dollars);
   cout << "$" << dollars << " converts into " << pesos << " pesos." << endl << endl;

         return 0;
}

//       ************************************************************************
//       convertMulti
//
//       task:      This function takes a dollar value and converts it to euros
//                and pesos
//       data in:  dollars
//       data out: euros and pesos
//
//       ************************************************************************

void convertMulti(float dollars, float& euros, float& pesos)
{
         cout << "The function convertMulti with dollars, euros and pesos "
                  << endl << " was called with " << dollars << " dollars" << endl << endl;
   euros = dollars * CONVERTEURO;
   pesos = dollars * CONVERTPESO;
```

```
}

//      ************************************************************************
//      convertMulti
//
//      task:       This function takes a dollar value and converts it to euros
//                  pesos and yen
//      data in:  dollars
//      data out: euros pesos yen
//
//      ************************************************************************

void convertMulti(float dollars, float& euros, float& pesos, float& yen)
{
        cout << "The function convertMulti with dollars, euros, pesos and yen"
                << endl << " was called with " << dollars << " dollars" << endl << endl;
   euros = dollars * CONVERTEURO;
   pesos = dollars * CONVERTPESO;
   yen = dollars * CONVERTYEN;
}

//      ************************************************************************
//      convertToYen
//
//      task:           This function takes a dollar value and converts it to yen
//      data in:    dollars
//      data returned: yen
//
//      ************************************************************************
```

```
float convertToYen(float dollars)
{
	cout << "The function convertToYen was called with " << dollars << " dollars"
		<< endl << endl;
   float yen = dollars * CONVERTYEN;
	return yen;
}

//	*********************************************************************
//	convertToEuros
//
//	task:		This function takes a dollar value and converts it to euros
//	data in:	dollars
//	data returned: euros
//
//	*********************************************************************

float convertToEuros(float dollars)
{
	cout << "The function convertToEuros was called with " << dollars
		<< " dollars" << endl << endl;
   float euros = dollars * CONVERTEURO;
	return 0;
}

//	*********************************************************************
//	convertToPesos
//
```

```
//          task:           This function takes a dollar value and converts it to pesos
//          data in:    dollars
//          data returned: pesos
//
//          ********************************************************************************

float convertToPesos(float dollars)
{
          cout << "The function convertToPesos was called with " << dollars
                    << " dollars" << endl;
   float pesos = dollars * CONVERTPESO;
          return pesos;
}
*********************************************************************************************
```

Output

```
Please input the amount of American Dollars you want converted
to euros and pesos
12.00
The function convertMulti with dollars, euros and pesos
 was called with 12.00 dollars

$12.00 converts into 12.72 euros and 116.76 pesos.

Please input the amount of American Dollars you want converted
to euros, pesos and yen
12.33
The function convertMulti with dollars, euros, pesos and yen
 was called with 12.33 dollars
```

$12.33 converts into 13.07 euros, 119.97pesos, and 1533.24 yen.

Please input the amount of American Dollars you want converted

to yen

5.58

The function convertToYen was called with 5.58 dollars

$5.58 converts into 693.87 yen.

Please input the amount of American Dollars you want converted

to euros

7.87

The function convertToEuros was called with 7.87 dollars

$7.87 converts into 0.00 euros.

Please input the amount of American Dollars you want converted

to pesos

7.77

The function convertToPesos was called with 7.77 dollars

$7.77 converts into 75.60 pesos.

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Question Answer

Exercise 1 wanted to read the program very carefully and notice the overloaded functions, and stubs.

Exercise 2 wanted to complete the stubs into full functions.

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Lab 6.2.4.1

Source Code

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

const double KILOTOMILES = 0.621;
const double MILESTOKILO = 1.61;

double KilometersToMiles(double kilometers, double& miles);
double MilesToKilometers(double miles, double& kilometers);

int main()
{
   double miles;
   double kilometers;
   int choice = 0;;

   cout << "Enter 1 to convert miles to kilometers." << endl;
   cout << "Enter 2 to convert kilometers to miles." << endl;
   cout << "Enter 3 to quit" << endl;
   cin >> choice;

   while(choice != 3)
   {
      if (choice == 1)
      {
         cout << "Enter amount of miles travelled." << endl;
         cin >> miles;
         kilometers  = MilesToKilometers(miles, kilometers);
         cout << "You travelled " << kilometers << " kilometers." << endl << endl;
         cout << "Enter 1 to convert miles to kilometers." << endl;
```

```
        cout << "Enter 2 to convert kilometers to miles." << endl;
        cout << "Enter 3 to quit" << endl;
        cin >> choice;
    }
    else if (choice == 2)
    {
        cout << "Enter amount of kilometers travelled." << endl;
        cin >> kilometers;
        miles = KilometersToMiles(kilometers, miles);
        cout << "You travelled " << miles << " miles." << endl << endl;
        cout << "Enter 1 to convert miles to kilometers." << endl;
        cout << "Enter 2 to convert kilometers to miles." << endl;
        cout << "Enter 3 to quit" << endl;
        cin >> choice;
    }
    else if (choice == 3)
    {
        break;
    }
    else
    {
        cout << "Invalid input." << endl << endl;
        cout << "Enter 1 to convert miles to kilometers." << endl;
        cout << "Enter 2 to convert kilometers to miles." << endl;
        cout << "Enter 3 to quit" << endl;
        cin >> choice;
    }
}
```

```
    return 0;
}

double KilometersToMiles(double kilometers, double& miles)
{
    miles = kilometers * KILOTOMILES;
    return miles;
}

double MilesToKilometers(double miles, double& kilometers)
{
    kilometers = miles * MILESTOKILO;
    return kilometers;
}
```

****

Output

```
Enter 1 to convert miles to kilometers.
Enter 2 to convert kilometers to miles.
Enter 3 to quit
2
Enter amount of kilometers travelled.
177.98
You travelled 110.526 miles.

Enter 1 to convert miles to kilometers.
Enter 2 to convert kilometers to miles.
Enter 3 to quit
1
Enter amount of miles travelled.
```

132.56

You travelled 213.422 kilometers.

Enter 1 to convert miles to kilometers.

Enter 2 to convert kilometers to miles.

Enter 3 to quit

4

Invalid input.

Enter 1 to convert miles to kilometers.

Enter 2 to convert kilometers to miles.

Enter 3 to quit

3

****

****

Lab 6.2.4.2

Source Code

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

double getWinPercentage(int wins, int losses);

int main()
{
   int wins;
   int losses;
   double winpercentage;
   cout << setprecision(3) << fixed << showpoint << endl;
```

```
    cout << "Enter the amount of wins the team has on the season." << endl;
    cin >> wins;

    cout << "Enter the amount of losses the team has on the season." << endl;
    cin >> losses;

    winpercentage = getWinPercentage(wins, losses);
    cout << "The team has a win percentage of %" << winpercentage << endl;

    return 0;
}

double getWinPercentage(int wins, int losses)
{
    double total = wins + losses;
    double average = wins / total;
    return average;
}
```

****

Output

```
Enter the amount of wins the team has on the season.
13
Enter the amount of losses the team has on the season.
3
The team has a win percentage of %0.812
```

****

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Lab 6.2.4.3

Source Code

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

double getTotalBill(double service, double test, double medicine);
double getTotalBill(double service, double test);

int main()
{
   int plan = 0;
   double service;
   double test;
   double medicine;
   double totalbill;
   cout << setprecision(2) << fixed << showpoint << endl;

   cout << "Enter 1 if you are a member of the dental plan." << endl;
   cout << "Enter any other number if you are not a member of the dental plan." << endl;
   cin >> plan;

   cout << "Enter the amount for the service charge." << endl;
   cin >> service;

   cout << "Enter the amount for the test charge." << endl;
   cin >> test;

   if (plan == 1)
   {
```

```
        totalbill = getTotalBill(service, test);
        cout << "Total bill is $" << totalbill << endl;
    }
    else
    {
        cout << "Enter the amount for the medicine charge." << endl;
        cin >> medicine;
        totalbill = getTotalBill(service, test, medicine);
        cout << "Total bill is $" << totalbill << endl;
    }

    return 0;
}

double getTotalBill(double service, double test, double medicine)
{
    double total = service + test + medicine;
    return total;
}

double getTotalBill(double service, double test)
{
    double total = service + test;
    return total;
}
```

****

Output

Enter 1 if you are a member of the dental plan.

Enter any other number if you are not a member of the dental plan.

1

Enter the amount for the service charge.

13.37

Enter the amount for the test charge.

96.99

Total bill is $110.36

****