LAB 6.1 Functions with No Parameters

Retrieve program proverb.cpp from the Lab 6 folder. The code is as follows

```
// This program prints the proverb
// "Now is the time for all good men to come to the aid of their
party"
// in a function (procedure) called writeProverb that is called by
the main function
//PLACE YOUR NAME HERE
#include <iostream>
using namespace std;
void writeProverb(); //This is the prototype for the writeProverb
function
int main()
{
// Fill in the code to call the writeProverb function
return 0;
}
//
********************************************************************
*
// writeProverb
//
// task: This function prints a proverb
// data in: none
// data out: no actual parameter altered
//
//
********************************************************************
// Fill in the function heading and the body of the function that
will print
// to the screen the proverb listed in the comments at the beginning
of the program:
```

Exercise 1: Fill in the code (places in bold) so that the program will print out the proverb listed in the comments at the beginning of the program. The proverb will be printed by the function which is called by the main function.

LAB 6.2 Introduction to Pass by Value

Retrieve program newproverb.cpp from the Lab 6 folder. The code is as follows:

```
// This program will allow the user to input from the keyboard
// whether the last word to the following proverb should be party or
country:
// "Now is the time for all good men to come to the aid of their "
// Inputting a 1 will use the word party. Any other number will use the
word country.
// PLACE YOUR NAME HERE
#include <iostream>
#include <string>
using namespace std;
// Fill in the prototype of the function writeProverb.
int main ()
{
int wordCode;
cout << "Given the phrase:" << endl;
cout << "Now is the time for all good men to come to the aid of their ___"
<< endl;
cout << "Input a 1 if you want the sentence to be finished with party"
<< endl;
cout << "Input any other number for the word country" << endl;
cout << "Please input your choice now" << endl;
cin >> wordCode;
cout << endl;
writeProverb(wordCode);
return 0;
}
//
*************************************************************************
***
// writeProverb
//
// task: This function prints a proverb. The function takes a number
// from the call. If that number is a 1 it prints "Now is the time
// Otherwise, it prints "Now is the time for all good men
// to come to the aid of their country."
// data in: code for ending word of proverb (integer)
// data out: no actual parameter altered
//
//
*************************************************************************
**
void writeProverb (int number)
// for all good men to come to the aid of their party
{
// Fill in the body of the function to accomplish what is described above
}
```

Exercise 1: Some people know this proverb as “Now is the time for all good men to come to the aid of their country” while others heard it as “Now is the time for all good men to come to the aid of their party.” This program will allow the user to choose which way they want it printed. Fill in the blanks of the program to accomplish what is described in the program comments. What happens if you inadvertently enter a float such as -3.97?

Exercise 2: Change the program so that an input of 1 from the user will print “party” at the end, a 2 will print “country” and any other number will be invalid so that the user will need to enter a new choice.

Sample Run:

```
Given the phrase:
Now is the time for all good men to come to the aid of their __
Input a 1 if you want the sentence to be finished with party
Input a 2 if you want the sentence to be finished with country
Please input your choice now
4
I'm sorry but that is an incorrect choice; Please input a 1 or 2
2
Now is the time for all good men to come to the aid of their country
```

Exercise 3: Change the previous program so the user may input the word to end the phrase. The string holding the user’s input word will be passed to the proverb function instead of passing a number to it. Notice that this change requires you to change the proverb function heading and the prototype as well as the call to the function.

Sample Run:
Given the phrase:
Now is the time for all good men to come to the aid of their _____
Please input the word you would like to have finish the proverb
family
Now is the time for all good men to come to the aid of their family

LAB 6.3 Returning Value

Retrieve program area.cpp from the Lab 6 folder. The code is as follows:

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

//PLACE YOUR NAME HERE

//fill in this line to define prototype of the function calcArea


int main()

{
  float width, length,area;


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

  cout << "Enter width and length of a rectangle :" ;
  cin >> width >> length;

  // Fill in this line to call the the calcArea
  cout << "The area of a rectangle is  " << area << endl;

  return 0;
}


// This function takes in width and length of a retangle and calculate the
area of the rectangle
//fill in the return type for the below calcArea
________ calcArea( float width, float length ) {
    area = width * length;
      //fill in this line to return the area of the rectangle
}}
```

Exercise 1: Caomplete the following statements in the program:
Line 29 : filling in return type for the function calcArea
Line 32 : add return statement to return the area of the rectangle
Line 7 : define the prototype of the area

Run the program. What is the area value in the output ?

Exercise 2 : Fill in the calling statement in Line 21.
Run the program. Is the area show correctly in the program ?

Lab 6.4 Introduction to Pass by Reference

Retrieve program paycheck.cpp from the Lab 6 folder. The code is as follows:

```
// This program takes two numbers (payRate & hours)
// and multiplies them to get grosspay.
// It then calculates net pay by subtracting 15%
//PLACE YOUR NAME HERE

#include <iostream>
#include <iomanip>
using namespace std;
//Function prototypes
void printDescription();
void computePaycheck(float, int, float&, float&);
int main()
{
float payRate;
float grossPay;
float netPay;
int hours;
cout << setprecision(2) << fixed;
cout << "Welcome to the Pay Roll Program" << endl;
printDescription(); //Call to Description function
cout << "Please input the pay per hour" << endl;
cin >> payRate;
cout << endl << "Please input the number of hours worked" << endl;
cin >> hours;
cout << endl << endl;
computePaycheck(payRate,hours,grossPay,netPay);
// Fill in the code to output grossPay
cout << "The net pay is $" << netPay << endl;
return 0;
}

// ********************************************************************
// printDescription
//
// task: This function prints a program description
// data in: none
// data out: no actual parameter altered
//
// ********************************************************************

void printDescription() // The function heading
{
cout << "************************************************" << endl << endl;
cout << "This program takes two numbers (payRate & hours)" << endl;
cout << "and multiplies them to get gross pay " << endl;
cout << "it then calculates net pay by subtracting 15%" << endl;
cout << "************************************************" << endl << endl;
}

// *********************************************************************
// computePaycheck
//
```

```
// task: This function takes rate and time and multiples them to
// get gross pay and then finds net pay by subtracting 15%.
// data in: pay rate and time in hours worked
// data out: the gross and net pay
//
// ***************************************************************
void computePaycheck(float rate, int time, float& gross, float& net)
{
// Fill in the code to find gross pay and net pay
}
```

Exercise 1: Fill in the code (places in bold) and note that the function computePaycheck determines the net pay by subtracting 15% from the gross pay. Both gross and net are returned to the main() function where those values are printed.
Exercise 2: Compile and run your program with the following data and make
sure you get the output shown.

Please input the pay per hour
9.50
Please input the number of hours worked
40
The gross pay is $380
The net pay is $323
We hoped you enjoyed this program

Exercise 3: Are the parameters gross and net, in the modified calPaycheck function you created in Exercise 1 above, pass by value or pass by reference?
Exercise 4: Alter the program so that gross and net are printed in the function compute computePaycheck instead of in main(). The main() function executes the statement

cout << "We hoped you enjoyed this program" << endl;

after the return from the function calPaycheck.
Exercise 5: Run the program again using the data from Exercise 2. You should get the same results. All parameters should now be passed by value.

LAB 6.5 Student Generated Code Assignments

Option 1: Write a program that will read two floating point numbers (the first read into a variable called first and the second read into a variable called second) and then calls the function swap with the two argument first and second. The swap function having parameters number1 and number2 should swap the value of the two variables. Note: This is similar
to a program you did in Lesson Set 1; however, now you are required to use a function. You may want to look at logicprob.cpp from Lesson Set 1.

Sample Run:
Enter the first number
Then hit enter
80
Enter the second number
Then hit enter
70

You input the numbers as 80 and 70.
After swapping, the first number has the value of 70 which was the value of the second number
The second number has the value of 80 which was the value of the first number

Exercise 1: Compile the program and correct it if necessary until you get no syntax errors.
Exercise 2: Run the program with the sample data above and see if you get the same results.
Exercise 3: The swap parameters must be passed by ___________. (Assume that main produces the output.) Why?

Option 2: Write a program that will input miles traveled and hours spent in travel. The program will determine miles per hour. This calculation must be done in a function other than main; however, main will print the calculation. The function will thus have 2 parameters: miles, hours and return the value of mile per hour.

Output is fixed with 2 decimal point precision.

Sample Run:
Please input the miles traveled
475
Please input the hours traveled
8
Your speed is 59.38 miles per hour

Option 3:

Define a function calcAverageGrade that contains 3 integer parameter list : sumOfScore, totalStudent, average mark. The function shall calculate the average mark based on the sumOfScore and totalStudent :

Write a program that will prompt user number of student. Then, the program will allow the user to enter the score for each students. The program shall call the function calcAverageGrade to calculate the average Score. The main function will then determine the letter grade of that average based on the following:.

90–100 A
80–89 B
70–79 C
60–69 D
0–59 F

Sample Run:
Enter the number of grades
3
Enter a numeric grade between 0-100
90
Enter a numeric grade between 0-100
80

```
Enter a numeric grade between 0-100
50
The grade is C
```

Option 4: Write a program that will convert miles to kilometers and kilometres to miles. The user will indicate both a number (representing a distance) and a choice of whether that number is in miles to be converted to kilometres or kilometers to be converted to miles. Each conversion is done with a value returning function. You may use the following conversions.

1 kilometer = .621 miles
1 mile = 1.61 kilometers

Sample Run:

```
Please input
1 Convert miles to kilometers
2 Convert kilometers to miles
3 Quit
1

Please input the miles to be converted
120
120 miles = 193.2 kilometers

Please input
1 Convert miles to kilometers
2 Convert kilometers to miles
3 Quit
2
Please input the kilometers to be converted
235
235 kilometers = 145.935 miles

Please input
1 Convert miles to kilometers
2 Convert kilometers to miles
3 Quit
3
```