Lab 10: Functions with value and reference parameters **Due:** 10/9/24

Problem: Many businesses in this area have machines that automatically return the appropriate change in coins for amounts less than $1.00. You have been hired to write a program to determine the best set of coins to be returned as change (best being the minimal number of coins). For example, if you were to give back 31 cents, then the best combination is a quarter, a nickel and a penny (as opposed to three dimes and a penny, or a quarter and 6 pennies, etc.). Assume that the only coins are quarters, dimes, nickels, and pennies.

Algorithm solution (in pseudocode):

To solve this problem your program must perform the following tasks:

Declare variables amount (amount in cents), count25 (quantity of quarters), count10 (quantity of dimes), count5 (quantity of nickels), count1 (quantity of pennies), and count (quantity of coins) to hold whole values
Prompt the user to "Enter amount in cents to be returned as change: "
Read the value from the keyboard and store it in the corresponding variable
Call **coinChanger()** to calculate the quantity of each type of coin and the total number of coins that are needed to provide a given change
Call function **printChange()** to print the amount of change, the quantity of each type of coin and the total number of coins

You need to **define** the following **functions** to implement the solution:

1) To calculate the quantity of each type of coins that are needed to get the change and the total number of coins that will be needed, you must define function **coinChanger(cents, c25, c10, c05, c01, coincount)**. It receives the amount in cents for change and returns the quantity of quarters, the quantity of dimes, the quantity of nickels, the quantity of pennies, and the number of coins needed for the change. All the values are whole numbers.
This function must calculate the quantity of each type of coins that are needed to get the change and the total number of coins that will be needed and return them to the caller.

2) To print the output you must define function **printChange(cents, c25, c10, c05, c01, coincount)**. It receives the amount in cents for change, the quantity of quarters, the quantity of dimes, the quantity of nickels, the quantity of pennies, and the number of coins needed for the change. All the values are whole numbers.
This function must print the message to the screen (formatted as shown in my examples):

"You need to use " , coincount, " coins for a change of ", cents, " cents:"
c25, "Quarters"
c10, "Dimes"
c05, "Nickels"
c01, "Pennies"

IMPORTANT:

1. you must choose the most appropriate type of function and type of parameters for each of the functions described above.

2. You must use ONLY the material learned so far in this course to solve the problem in **coinChanger()**. If you use something that I have not covered in my class you will get NO CREDIT for it (no if statements are allowed). Think abstractly how you would do this (determine the quantity of each type of coin to get the change); as you do it, use paper and pencil to outline the steps and then think how to implement your solution in C++.

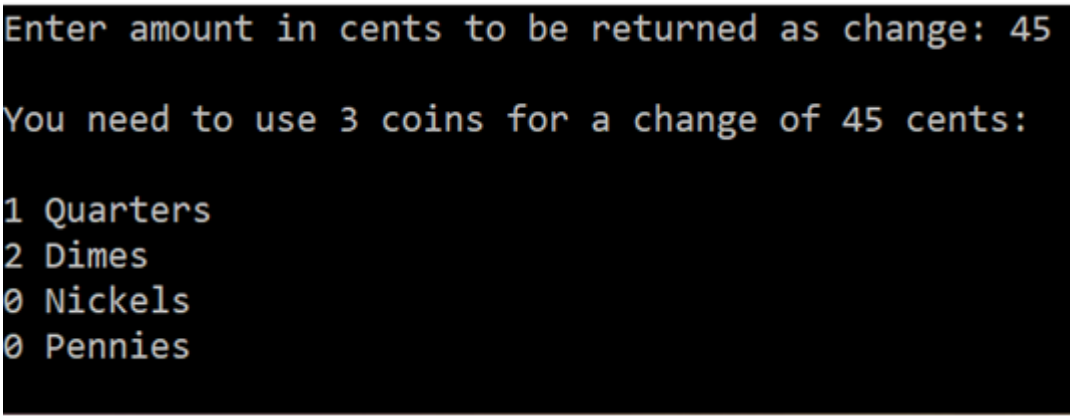
The program must compile without errors or warnings.

Open **lab10.cpp** in your IDE and implement the above algorithm (already provided in the source code as comments).

Implement the above algorithm (already provided in the source code as comments).

Note:

- Do NOT remove or modify the statements that I use to test certain things in your program.
- Pay attention to the input and the output formats. Your solution must behave exactly like mine.
- Carefully analyze the following figures and use them as a reference to ensure you do the right things.



- Test and compare your solution with mine for different amounts of change to ensure they always produce the same outputs. Pay attention to the output format.
- Ensure your formulas do not use mixed data types by defining your literal values appropriately and using the static_cast operator if needed.

Don't forget to include at the top of the program the comments shown below with your information (name, class and section number, etc.)

```
//////////////////////////////////////////////////////////////////
//
// Name: <Put your name here>
// Date: <Today's date>
// Class: <Your class number and section number, like: CSCI 1470.02>
// Semester: <This semester, like: Fall 2012>
// CSCI/CMPE 1470 Instructor: <Your lecture instructor's name>
//
```

// Program Description: Enter here **your** description of what the program does
//
//

When done, submit your solution through Blackboard using the "Assignments" tool. Do Not email it.

Paste the link to your final solution along with your source code in the textbox opened when you click on Create Submission before you click on Submit.

The following is the basic criteria to be used to grade your submission:

You start with 100 points and then lose points as you don't do something that is required.

-5: Minor mistakes
incorrect input format
incorrect output format
Missing comments at the top of the program
-10: Moderate mistakes
wrong variable names
wrong data types
no/too few comments
mixed data types in expression
incorrect function call (each)
incorrect type of parameters (value or reference)
missing libraries
-20: Major mistakes
incorrect implementation of the function (each) [For example, wrong type of function]
program does not implement the provided algorithm
program does not pass all tests
Incorrect/missing source code
Incorrect/missing link to your solution
-60: didn't implement function coinChanger()
-40: didn't implement function printChange()
-50: program doesn't compile
-100: The code submitted is not your creation (you got it from a web site or another person)
Late

Important: more points may be lost for other reasons not specified here.

The following are sample runs of the program:

```
Enter amount in cents to be returned as change: 67

You need to use 6 coins for a change of 67 cents:

2 Quarters
1 Dimes
1 Nickels
2 Pennies
```

```
Enter amount in cents to be returned as change: 48

You need to use 6 coins for a change of 48 cents:

1 Quarters
2 Dimes
0 Nickels
3 Pennies
```

```
Enter amount in cents to be returned as change: 17

You need to use 4 coins for a change of 17 cents:

0 Quarters
1 Dimes
1 Nickels
2 Pennies
```

```
Enter amount in cents to be returned as change: 66

You need to use 5 coins for a change of 66 cents:

2 Quarters
1 Dimes
1 Nickels
1 Pennies
```