

Classwork 9: Simple Functions

In-class Date: Monday 29 April

Due Date: Monday 06 May

Objectives

To practice implementing functions and passing arrays.

Part 1: Counting Change

For this part you will implement a simple function, called `countchange()`, that computes the value of a certain amount of change, given the number of coins of each kind.

Example Compilation and Execution

```
[arsenaul@linux1 cw9]$ gcc -Wall countchange.c
[cos1@linux1 cw9]$ ./a.out
This program will compute the worth of your change.
```

```
Enter number of quarters you have: 3
Enter number of dimes you have: 2
Enter number of nickels you have: 4
Enter number of pennies you have: 3
Your 3 quarters, 2 dimes, 4 nickels and 3 pennies are worth 118 cents.
[arsenaul@linux1 cw9]$
```

Starter Code

Use this code to help you get started.

```

/*****
** File:   countchange.c
** Author: <myName>
** Date:   <todaysDate>
** Section: CMSC104 Section 02
** E-mail: <myEmailAddress>
**
** This file contains the main program for part 1 of Classwork 9.
** The program asks the user for a total number of
** quarters, dimes, nickels, and pennies, then
** calculates and displays the total number of cents.
*****/

#include <stdio.h>

/*
    The function prototype is written for you.

```

```

    This prototype says that countchange() has four int parameters
    and returns an int.
*/

int countchange(int, int, int, int);

/* Don't change the main() function! */
int main () {
    int cents;
    int quarters, dimes, nickels, pennies;

    printf("This program will compute the worth of your change.\n\n");
    printf("Enter number of quarters you have: ");
    scanf("%d", &quarters);
    printf("Enter number of dimes you have: ");
    scanf("%d", &dimes);
    printf("Enter number of nickels you have: ");
    scanf("%d", &nickels);
    printf("Enter number of pennies you have: ");
    scanf("%d", &pennies);

    cents = countchange(quarters, dimes, nickels, pennies);

    printf("Your %d quarters, %d dimes, %d nickels and %d pennies",
           quarters, dimes, nickels, pennies);
    printf(" are worth %d cents.\n", cents);

    return 0;
}
/* end of main() function */

/* Function countchange

    Computes the worth of the given number of quarters,
    dimes, nickels and pennies.

*/

/* TODO: Implement your function here */

```

Notes

Below the main program, write the C code to implement the `countchange()` function. Give meaningful names to your parameters. To compute the total number of cents, use 25 for quarters, 10 for dimes, 5 for nickels and 1 for pennies. Be sure to use the `+=` operator in your function.

Part 2: Making Change

For this part you will implement a simple function, called `makechange()`, that figures out how to make change for a given number of cents.

Example Compilation and Execution

```
[arsenaul@linux1 cw9]$ gcc -Wall makechange.c
[arsenaul@linux1 cw9]$ ./a.out
This program will figure out the change for you.
```

```
Enter number of cents: 68
Make change using 2 quarters, 1 dimes, 1 nickels and 3 pennies.
[arsenaul@linux1 cw9]$
```

In this example, the function `makechange()` determined that 2 quarters, 1 dime, 1 nickel and 3 pennies equals 68 cents. (This is the fewest number of coins you can have to make up 68 cents.) The function “communicates” this result to the main program using 4 reference parameters.

Starter Code

Use this code to help you get started.

```

/*****
** File:  makechange.c
** Author: <myName>
** Date:  <todaysDate>
** Section: CMSC104 Section 02
** E-mail: <myEmailAddress>
**
** This file contains the main program for part 2 of Classwork 9.
** The program asks the user for a total number of cents
** and makes change using quarters, dimes, nickels, and pennies.
*****/

#include <stdio.h>

/*
    The function prototype is written for you.
    This prototype says that makechange() has two parameters.
    The first parameter is a normal int. The next
    parameter is an integer array of length 4.
*/

void makechange(int, int []);

/* Don't change the main() function!!! */
int main () {
    int cents;
```

```

int change[4];

printf("This program will figure out the change for you.\n\n");
printf("Enter number of cents: ");
scanf("%d", &cents);

makechange(cents, change);

printf("Make change using %d quarters, %d dimes, %d nickels and %d pennies.\n",
       change[0], change[1], change[2], change[3]);

return 0;
}
/* end of main function */

/* Function makechange

Stores # of quarters, dimes, nickels and pennies
add up to n cents in the change array.
*/

/* TODO: Implement the function makechange() here: */

```

Notes

Below the main program, write the C code to implement the `makechange()` function. Give meaningful names to your parameters. Give the reference parameters names that immediately tell you they are array pointers to `int`.

To compute the number of quarters, dimes, nickels and pennies, you should use the integer division operator `/` and the modulus operator `%`.

Grading Rubric

- `countchange.c` header comment: 2 points
- `countchange.c` body comments: 3 points
- `countchange.c` compiles: 20 points
- `countchange.c` counts change correctly: 25 points
- `makechange.c` header comment: 2 points
- `makechange.c` body comments: 3 points
- `makechange.c` compiles: 20 points
- `makechange.c` makes change correctly: 25 points

What to Submit

Use the `script` command to record yourself compiling and running your programs 3 times, using different numbers each time. (Do not record yourself editing your program!) Exit from `script`. Submit your programs and the typescript file.

```
[arsenaul@linux1 cw9]$ submit cmsc104_arsenaul cw9 countchange.c makechange.c typescript
```

Verify

Make sure you submitted the assignment correctly.

```
[arsenaul@linux1 cw9]$ submitls cmsc104_arsenaul cw9
```