Lab 3
Arithmetic Operations - Debugging

1 Lab Objectives

- Practice variables and simple arithmetic operations.
- Debugging C programs.

2 Variables and Arithmetic Operations

2.1 Problem 1 - Dozens of Apples

Write a C program that takes a number of apples as input and tells the user how many dozens of apples he/she has and how many extra apples are left over.
For example: if the number of apples = 50, the output should be: "4 dozens and 2 apples".
(**Note that**, a dozen of something means 12 items of that thing.)

2.2 Problem 2 - Resistance

The equivalent resistance of resistors connected in series is calculated by adding the resistances of individual resistors. The formula for resistors connected in parallel is a little more complex. Given two resistors with resistances R_1 and R_2 connected in parallel, the equivalent resistance is given by the inverse of the sum of the inverses: $\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2}$

Write a C program that given 3 resistances, R_1, R_2, R_3, outputs the equivalent resistance R_{eq} when:

1. R_1, R_2, R_3 are connected in series.
2. R_1, R_2, R_3 are connected in parallel.

3 Debugging

This part will be illustrated and done in the lab session. **No deliverables are required for this section**.
You are encouraged, though, to try it at home before the lab.

3.1 Exercise 1

You have stumbled upon this unknown program. You are required to discover what it does ...

```
#include <stdio.h>

int main(){
  int x, y, z;
  printf("Enter x:\n");
  scanf("%d", &x);
  printf("Enter y:\n");
  scanf("%d", &y);
  printf("Enter z:\n");
  scanf("%d", &z);
  y+=x;
  x+=z;
  z+=y;
  z-=x;
  y-=z;
  x-=y;
  printf("x = %d\ny = %d\nz = %d\n", x, y, z);
  return 0;
}
```

- – Set a breakpoint (using F5 in codeblocks) at the line "z-=x;"
  – Try running the program. Enter the values of x, y and z as 1, 2 and 3 respectively.
  – What are the values of x, y and z at the breakpoint?
  – Try again with x, y and z set to 1, 5 and 10 respectively.
- – Set a breakpoint at the "line y+=x;"
  – run the program step by step (using F7 in codeblocks).
  – Watch for the values of x, y and z (using the watch pane).
  – Enter the values of x, y and z as 1, 2 and 3.

– Write the value of x, y and z after each step.

Statement	Value of x	Value of y	Value of z
y+=x			
x+=z			
z+=y			
z-=x			
y-=z			
x-=y			

- – Try again with x, y and z set to 1, 10 and 100 respectively.

Statement	Value of x	Value of y	Value of z
y+=x			
x+=z			
z+=y			
z-=x			
y-=z			
x-=y			

- What is the purpose of this program?

4 Notes

- You are required to implement problems 1 and 2 at home, the lab will be for discussion only. You should bring the programs on your laptop or on a flash memory.
- Cheating will be severely penalized (for both parties). So, it is better to deliver nothing than deliver a copy!
- You are encouraged to ask any questions on Piazza, or in person.

Good Luck isA :)