CSC 212: Data Structures and Abstractions
University of Rhode Island
Spring 2019
Weekly Problem Set #1

This assignment is due Thursday 2/7 before lecture. Please turn in neat, and organized, answers hand-written on standard-sized paper **without any fringe**.

1. Provide a sequence of Bash commands that will:

   - go to your default home directory;
   - create a directory test;
   - rename test to myproject;
   - enter the directory myproject;
   - create a new empty file main.c;
   - list all files in myproject, including hidden files;
   - return to the parent directory.

   Solution:

   ```
   cd
   mkdir test
   mv test myproject
   cd myproject
   touch main.c
   ls -a
   cd ..
   ```

2. Provide a sequence of Bash commands that will:

   - create files a.txt, b.txt, and c.txt;
   - write the line a: 1 2 3 4 5 to a.txt;
   - write the line b: 6 7 8 9 10 to b.txt;
   - write the line a: 11 12 13 14 15 to c.txt;
   - concatenate a.txt, b.txt, and c.txt into all.txt.

Solution:

```
touch a.txt b.txt c.txt
echo "1 2 3 4 5" >> a.txt
echo "6 7 8 9 10" >> b.txt
echo "11 12 13 14 15" >> c.txt
cat a.txt b.txt c.txt > all.txt
```

3. Convert the following binary numbers to decimals:

   - 1010010010010000
   - 0001000101010001
   - 1001010100001100
   - 0001010101011011

   Solution:

   ```
   42,128
   4,433
   38,156
   5467
   ```

4. Convert the binary numbers from the previous exercise to hexadecimals

   Solution

   ```
   A490
   1151
   950C
   155B
   ```

5. Convert your Student ID number to hexadecimal representation. Hint: convert to binary, and then, to hexadecimal.

   Ex. Solution:

   ```
   100602642 -> 10111111111000100110001001O -> 5FF1312
   ```

6. Write a function that returns a missing number in an array of integers ranging from 1 to n. For example, given $[3, 2, 1, 5]$ and $n = 5$, output 4.

   Solution:

```
unsigned int missing(unsigned int* input, unsigned int n)
{
    unsigned int sum = 0;
    for(unsigned int i = 0; i < n-1; i++)
    {
        sum += input[i];
    }
    return n*(n+1)/2 - sum; // closed form sigma notation
{
```

7. What is the output of the following code? If it breaks at any point, indicate what went wrong.

```
#include <iostream>

int mystery(int x, int *y) {
    x = x + 10;
    *y = x * 2;
    return x;
}

int* mystery2() {
    int x = 50;
    return &x;
}

int main() {
    int x = 2, y = 3;
    x = mystery(x, &y);
    std::cout << "(x, y): (" << x << ", " << y << ")" << std::endl;
    int *z = mystery2();
    std::cout << "z: " << *z << std::endl;
}
```

Solution:

```
x = 12
y = 24
z causes a segfault since it is the address of a deallocated local variable
```