CSCI 135 Software Design and Analysis, C++
Homework 3
Solution

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Problem 1: Collatz
Implement the task of problem 3 of HW2 without using any functions, except
the main() function.

```cpp
#include <iostream>
using std::cout;

int main() {
  int max=-1;
  int i;
  for (int n=1; n<=1000000; n=n+1) {
    unsigned int m=n;
    int count=0;
    while (m!=1) {
      if (m%2==0)
        m=m/2;
      else
        m=3*m+1;
      count=count+1;
    }
    if (count>max) {
      max=count;
      i=n;
    }
  }
  cout<<"number "<<i<<" takes the longest: "<<max<<" steps\n";
}
```

Problem 2: FIZZ BUZZ

You have two items, a FIZZ and a BUZZ. Each item has a value and a weight. In addition, you have a bag that can carry a certain maximum weight. You are interested in packing the maximum possible value you can (in the best case you can carry both FIZZ and BUZZ). Write a function called fizzbuzz that accepts as parameters:

- the value and weight of FIZZ

- the value and weight of BUZZ

- the maximum weight that the bag can carry

and returns the maximum **value** that your bag can carry.

In the main function, ask the user to input all values and weights needed, call the function fizzbuzz and output:

- NONE: if the function returns 0

- FIZZ: if the function returns the value of FIZZ

- BUZZ: if the function returns the value of BUZZ

- FIZZBUZZ: if the function returns the sum of the values of FIZZ and BUZZ

```
#include <iostream>
using std::cout;
using std::cin;

float fizzbuzz(float fizz_v, float fizz_w,
               float buzz_v, float buzz_w,
               float bag_w) {
  if (fizz_w+buzz_w<=bag_w) //they both fit together
    return fizz_v+buzz_v;
  else if (fizz_w<=bag_w && buzz_w<=bag_w) //they both fit individually
    if (fizz_v>buzz_v) //in this case, see which one is more valuable
      return fizz_v;
    else
      return buzz_v;
  else if (fizz_w<=bag_w) //only fizz fits
    return fizz_v;
  else if (buzz_w<=bag_w) //only buzz fits
    return buzz_v;
  else
    return 0; //none of them fits
}
```

```cpp
int main() {
  float fizz_v;
  float fizz_w;
  float buzz_v;
  float buzz_w;
  float bag_w;

  cout<<"input fizz_value fizz_weight buzz_value buzz_weight bag_weight: ";
  cin>>fizz_v>>fizz_w>>buzz_v>>buzz_w>>bag_w;

  float value=fizzbuzz(fizz_v, fizz_w, buzz_v, buzz_w, bag_w);

  if (value==fizz_v+buzz_v)
    cout<<"FIZZBUZZ\n";
  else if (value==fizz_v)
    cout<<"FIZZ\n";
  else if (value==buzz_v)
    cout<<"BUZZ\n";
  else
    cout<<"NONE\n";

}
```