

**Honors Introduction to C**  
**Exam #3**  
**11/20/2017**

Name: \_\_\_\_\_

**Directions: Please answer questions 1 - 5 in C, and questions 6 - ? in C++.**

**Part I - C**

1) (10 pts) Write a function that takes in a C string and without calling any string.h functions returns the number of lower case letters in the string. (Hint: remember you can compare characters with the usual relational operators such as <, <=, etc. and that the Ascii values of all the lower case letters are in order with 'a' being the lowest and 'z' being the highest.)

```
int numLowerCase(char* str) {
```

```
}
```

2) (10 pts) Write a function that takes in an array of n strings of lowercase letters only (n is a parameter to the function), and returns the index of the string that comes first alphabetically. You may use any functions in string.h that you see fit.

```
int indexFirstAlpha(char words[][20]) {
```

```
}
```

3) (12 pts) You were shown a bubble sort in class. Show the result of running a bubble sort on the array shown below. In particular, show the contents of the array after each iteration. (Note: It's possible that the contents don't change between iterations.)

<b>Index</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
<b>Value</b>	<b>27</b>	<b>16</b>	<b>19</b>	<b>11</b>	<b>99</b>	<b>37</b>	<b>67</b>	<b>52</b>	<b>31</b>	<b>48</b>	<b>15</b>
1 <sup>st</sup>											
2 <sup>nd</sup>											
3 <sup>rd</sup>											
4 <sup>th</sup>											
5 <sup>th</sup>											
6 <sup>th</sup>											
7 <sup>th</sup>											
8 <sup>th</sup>											
9 <sup>th</sup>											
10 <sup>th</sup>											

4) (5 pts) Create a struct color that stores information about a color. This struct should contain three integer values named red, green and blue, respectively.

4) (10 pts) Create a struct to store information about a soda. A soda has a name (string of 19 or fewer letters), a weight in ounces (an integer for the purposes of this question), a calorie count (also an integer), and a color of type struct color.

5) (6 pts) Write three lines of code: (1) declare a variable of type "struct soda" called coke. (2) Set the red component of the color component of coke to 77. (3) Set the name of the coke variable to "Coca-Cola".

## **Part II - C++**

6) (12 pts) Write a C++ function below so that it takes in a string of lowercase letters and returns the score of that string in Scrabble. To help you, I've provided the constant array we created in class with all of the Scrabble letter values (index 0 stores the value of a, index 1 stores the value of b, and so forth.)

```
using namespace std;
#include <string>
#include <iostream>

const int TILESCORES[] =
    {1,3,3,2,1,4,2,4,1,8,5,1,3,1,1,3,10,1,1,1,1,1,4,4,8,4,10};

int scrabbleScore(const string& s) {

}

}
```

7) (10 pts) Write a function in C++ that takes in a vector of strings and a string for which to search and returns the index where the search string is first found. If it's not found, the function should return -1. Note: use an exact string match.

```
using namespace std;
#include <string>
#include <iostream>
#include <vector>

int search(vector<string> list, string s) {

}

}
```

8) (20 pts) Consider creating a fraction class in C++ where we overload the + and \* operators. Some of the class is provided for you already. Just fill in the two functions to perform overloading these operators:

```
using namespace std;
#include <iostream>
int gcd(int,int);

class fraction {
public:
    fraction(int n, int d);
    friend fraction operator +(const fraction& f1, const fraction& f2);
    friend fraction operator *(const fraction& f1, const fraction& f2);
    friend ostream& operator <<(ostream& ostr, fraction f);
private:
    int num;
    int den;
};

int gcd(int a, int b) {
    return b == 0 ? a : gcd(b, a%b);
}

fraction::fraction(int n, int d) {
    int div = gcd(n, d);
    num = n/div;
    den = d/div;
}

fraction operator +(const fraction& f1, const fraction& f2) {

}

fraction operator *(const fraction& f1, const fraction& f2) {

}

ostream& operator <<(ostream& ostr, fraction f) {
    ostr << f.num << "/" << f.den;
    return ostr;
}
```

9) (5 pts) Where was the Treaty of Versailles signed? \_\_\_\_\_

**Scratch Area - Please carefully mark anything on this page you would like graded.**

```
    return 0;  
}
```

9) (3 pts) Sweet by Holly's Black and Gold cupcake is inspired by what Orlando University?  
(Hint: The end of the online description of the cupcake reads, "Go Knights!")

\_\_\_\_\_

**Scratch Page - Please clearly mark any work on this page you would like graded.**