Written Assignment 1
Variables, Data Types and Math

CS152 – Computer Programming Fundamentals

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Q1-1

Consider the following block of Java code.

```
float a = 0.95f;
float b = 0.75f;

int c = (int)(a + b);
int d = (int)a + (int)b;
int e = Math.round(a + b);
```

What int values do c, d and e hold at the end of this code block? Is casting floating point values different than rounding?

Does it matter what order casting and arithmetic are done in?

Q1-2

Enter the following lines into IntelliJ inside a main() Method.

```
int a;
char b;
Integer r;
String s;
```

Notice the difference in coloring of char vs String and Integer vs. int in IntelliJ. In this example, int, char, Integer and String are all data types, so why are Integer and String colored differently than int, char and float?

That difference is mainly because of how these variables are stored in memory. Briefly describe the difference between how a char and a String are stored in Java.

Q1-3

Consider the following block of Java code.

```
int a = 2000000000; // 2 billion, 2x10^9
int b = 1000000000; // 1 billion, 1x10^9
int c = a + b;
```

What int value does c hold at the end of this code block?

Attempt this calculation in a graphing calculator (e.g. www.desmos.com). Explain why you obtain different results.

Q1-4

Consider the following block of Java code.

```
float a = 5000000000f; // 5 billion, 5x10^9
int b = (int)a;
```

What int value does b hold at the end of this code block? Explain this result.

Q1-5

Suppose part of a Java program is keeping time by counting upward in nanoseconds with an int variable that starts at zero. How much time from start will the it take the variable to overflow? You can round to the nearest tenth of a second.

Q1-6

Consider the following block of Java code.

```
char a = '5';
char b = '3';
char c = (char)(a + b);
```

What character does c hold at the end of this code block? Explain this result.

Q1-7

Consider the following block of Java code.

```
int a = 51;
char b = (char)a;
a += 5;
char c = (char)a;
a += 5;
char d = (char)a;
```

What characters do b, c and d hold at the end of this code block? Explain this result.

Q1-8

The following binary value is stored as an int (notice it is 32 bits). Convert it to hexadecimal and decimal using a scientific calculator (not an Internet utility) . You can check your answer with the binary and hexadecimal converter program given in the resources section of the assignment.

`195278` (Decimal)

Binary: `0b`

Hexadecimal: `0x`

`0b 0001 1011 0011 0010 0101 1110 0110 0111` (Binary)

Hexadecimal: `0x`

Decimal:
