

Lab 02 Variables, Data Types, and Type Conversion

Write a simple C++ program with the preprocessing statements and the `main` function. The return type of the `main` function should be `int` and there should be a `return` statement, i.e.:

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

int main() {

    // your code
    return 0;
}
```

Q1. `int` data type

Complete the following steps, inside the `main` function:

1. Declare a variable of type `int`, called "`num1`". Initialize its value to `2147483647`.
2. Declare another `int` variable called "`num2`".
3. Increment `num1` by `1` and assign the result to `num2`.
4. Output the value of `num1` and `num2` using `cout`.

Hints: The following outputs the value of `num1`.

```
cout << "Value of num1 is " << num1 << "\n";
```

What is the output? Why does the output look like this? What did you learn from this exercise?

Q2. `char` data type

Complete the following steps, inside the `main` function after your code for **Q1**:

1. Declare a variable of type `char`, called "`vChar1`", and initialize it to store the character `A`.
2. Declare another `char` variable, called "`vChar2`", and initialize it to store the character `0` (not the number `0`).
3. Output the values of `vChar1` and `vChar2` using `cout` (see Hints for **Q1**).
4. Increment the value of `vChar1` by `1` and save the value still in `vChar1`.
5. Output the value of `vChar1` now.

What is the output for step 3 and 5? Can you explain why the output looks like this? What did you learn from this exercise?

Q3. `double` data type

Complete the following steps, inside the `main` function after your code for **Q2**:

1. Declare a variable of type `double`, called "`vFloat1`", initialize it to be the result of `22.0` divided by `7` (division in C++ is represented by the `/` operator).
2. Output the value of `vFloat1`.

Q4. sizeof operator

Complete the following steps, inside the `main` function after your code for **Q3**:

1. Output the number of bytes used to store an `int` variable, using `sizeof`.

Hints: You may use the following:

```
cout << "Size of int is " << sizeof(int) << " bytes.\n";
```

2. Output the number of bytes used to store a `char` variable, using `sizeof`.
3. Output the number of bytes used to store `vFloat1`, using `sizeof`.

Q5. Implicit type conversion

Add the following code to the `main` function after your code for **Q4**. What's the output? Try to think about why.

```
int i = 5;
char a = 'B';
double x = 1.57;
i = i + x;
x = x * a;

cout << i << "\n";
cout << x << "\n";
```

Q6. Explicit type conversion

Add the following code to the `main` function. What's the value of `k` at each step? Observe if your answer is correct by adding necessary `cout` statements. Think about why.

```
int m = 3, n = 2;
double k;
k = m / n;
k = m / double(n);
k = double(m) / n;
k = double(m/n);
k = m / 2;
k = m / 2.0;
```