1. Start you C++ editor of choice and make a new project. Make sure that the directory that you are making the project in is the same as the GitHub folder, so that it is easy for you so send me your work. Each one of the following code excerpts should be its own project inside the lesson1 folder. **Look at the Programming Basics file if you need some help. Or skype me.**
2. A data type defines a set of values and a set of operations on those values. The program shows some main data types and arithmetic operators in C++ language. Try to compile and execute this program and see the printed results. This is only to validate that your complier is working.

5. #include <iostream>
6. using namespace std;
7. int main ()
8. {
9. // Declarations
10. const int x = 100;
11. int y;

14. int sum=0; //initialization
15. int difference;
16. float quotient;
17. int remainder;
18. int product;
19. // input
20. cout << "Enter an integer value for y: " << endl;
21. cin >> y;
23. // Arithmetic Operations
24. sum = x + y;
25. difference = x - y;
26. quotient = x / y; // When both operands are ints, / does integer division
27. remainder = x % y; // Modulo operator give the remainder for integer division
29. // Print results
30. cout << "The sum (x+y) is: " << sum << "\n";
31. cout << "The difference ( x-y ) is: " << difference << "\n";
32. cout << "The remainder (x % y) is: " << remainder << "\n";
33. cout << "The quotient (x / y) is: " << quotient << "\n";
35. return 0;
36. }

3. Modify the values of some variables in this program. Try to compile again and re-execute the program. Remember variables are data that is defined with the keywords; float, int, string, char, etc.

#include <iostream>

using namespace std;

int main ()

{

// Declarations

const int x = 100;

float y;

float sum=0; //initialization

float difference;

float quotient;

float remainder;

float product;

// input

cout <<"enter a float value for y"<< endl;

cin >> y;

// Arithmetic Operations

sum = x + y;

difference = x - y;

//remainder = x % y; notice that this operation is not allowed for float numbers

quotient = x / y;

// Print results

cout << "The sum (x+y) is: " << sum << "\n";

cout << "The difference ( x-y ) is: " << difference << "\n";

cout << "The quotient (x / y) is: " << quotient << "\n";

return 0;

}

4. Now, let us use the sizeof() operator and perform more arithmetic operations. This is just a demonstration, you don’t need to modify any of the following code in #4.

// Demonstrating the sizeof operator

#include <iostream>

using namespace std;

int main ()

{

// Declarations

char c;

double d;

long l;

float sum;

float mean;

// Print the size of variables

cout << "\n\t size of variables:" << endl;

cout << "\t(c)" << "\t" << "(d)"<<"\t" << "(l)" << endl;

cout << "\t "<< sizeof(c)<< "\t" << sizeof(d) << "\t" << sizeof(l) << endl;

// Arithmetic Operations

sum = sizeof(c)+sizeof(d)+sizeof(l);

mean = sum/3.0;

// print the output

cout << "The sum of bytes needed to store the variables is: " << sum << endl;

cout << "The average number of bytes needed to store each variable is: "<< mean << endl;

return 0;

}

1. **Calculate Some Statistics**

In this part, you are required to write a program that computes the variance of a set of values.   
**Variance**is used as a measure of how far a set of numbers are spread out from the mean. The formula of computing the variance is as follows:  
var(num1,num2,..., numk)= ((num1-mean)^2 + (num2-mean)^2 + ... +(numk-mean)^2)/k   
**i.e.** Computing the variance for the data set **{8, 10, 12, 14}**:  
1. Compute mean:  
mean = (8+10+12+14)/4 = 11.  
2. Compute variance:  
variance = ((8-11)^2 + (10-11)^2 + (12-11)^2 + (14-11)^2)/4 = 5  
This indicates that the values are close to the mean.

Now, consider the data set **{1,5,17,21}**. This data set also has a mean of 11, but the variance is **68** which indicates that the values are spread far from the mean (and each other).

To calculate variance, add the following lines to your previous program and run it again.

......

// Local variable declarations

float variance;

float d1, d2, d3, d4;

// Calculate their mean and variance

sum = 8 + 10 + 12 + 14;

mean = sum/4.0;

// Calculate variance

d1 = 8 - mean;

d2 = 10 - mean;

d3 = 12 - mean;

d4 = 14 - mean;

variance = (d1\*d1 + d2\*d2 + d3\*d3 + d4\*d4) / 4.0;

// Print variance

cout << "\n\nMean = " << mean << "\n";

cout << "Variance = " << variance << "\n";

// Calculate their mean and variance

sum = 1 + 5 + 17 + 21;

mean = sum/4.0;

// Calculate variance

d1 = 1 - mean;

d2 = 5 - mean;

d3 = 17 - mean;

d4 = 21 - mean;

variance = (d1\*d1 + d2\*d2 + d3\*d3 + d4\*d4) / 4.0;

// Print variance

cout << "\n\nMean = " << mean << "\n";

cout << "Variance = " << variance << "\n";

.........

#### 6. Write your own program to calculate the sum of three numbers.

Fill in the program below. Add only a few lines at a time. Compile and test..

#include <iostream>

using namespace std;

int main ()

{

// Declare your variables: 3 for the inputs, 1 for the total

// Read the 3 integers in from the user

// Print the 3 integers out to be sure you read them properly

// Calculate and store the total

// Print the total to the screen

return 0;

}