MODULE SEVEN: FUNCTIONS

Functions organize your code to enable re-use on different inputs.

SCOPE
Let's look at this sample program AdditionCalculator.java:

```
public class AdditionCalculator{
        public static int add(int x, int y){
                int sum = x +y;
                return sum;
        }

        public static void main(String args[]){
                int num_one = Integer.parseInt(args[0]);
                int num_two = Integer.parseInt(args[1]);
                int result = add(num_one,num_two);
                System.out.println(result);
        }
}
```

Suppose we execute the following two commands:
javac AdditionCalculator.java
java AdditionCalculator 5 3

This results in the following:
args[0] is set to the string "5"
args[1] is set to the string "3"
num_one is set to the int 5 (which is the string args[0] parsed to an int)
num_two is set to the int 3
result is set to the result of the function call add(5,3)

Within the add function:
int x is set to the first value passed into add(), which is an integer with value 5.
int y is set to the second value passed into add(), which is an integer with value 3
add computes int sum = 5+3 = 8
add returns 8

Back to main:
result is set to 8
print 8

Note that the variables *num_one* and *num_two* do not exist in the add function because they are out of scope. Likewise, the variables *x* and *y* do not exist in main. Each variable only exists within the brackets {} in which it is declared.

FUNCTION PROTOTYPE:
The first function we have seen is public static void main(String args[])

- public/private keyword
- static
    - do not use instance variables (all variables are defined for every "instance"- we will go into more detail about instances when we discuss object oriented programming).
    - static methods can call other static methods
- return type: void
- parameters: args[]

CHALLENGE ONE:
Let's look at your calculator class and see how we can improve it with functions. First, we will place your addition code into a function. We will make an add function that takes two integers as input and two strings as input. How are they different? Create a function for all of the existing calculator functionality.

BONUS CHALLENGE TWO:
Implement the divide function using a while loop and the add function. Place the divide function in a loop.