

COS Crash Course: Week 4

functions



name game



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jdoodle.com/online-java-compiler

Feel free to play around with it while I yap.

```
1 public class MyClass {  
2     public static void main(String args[]) {  
3         int x=10;  
4         int y=25;  
5         int z=x+y;  
6  
7         System.out.println("Sum of x+y = " + z);  
8     }  
9 }
```

Execute Mode, Version, Inputs & Arguments

JDK 17.0.1

☐ Interactive

Stdin Inputs

CommandLine Arguments

Execute

...

Result

warm-up: this week's apc pset.

Find the greatest common denominator of two ints, a and b, by recreating Euclid's algorithm, which divides b by the remainder of a/b until the remainder equals zero.

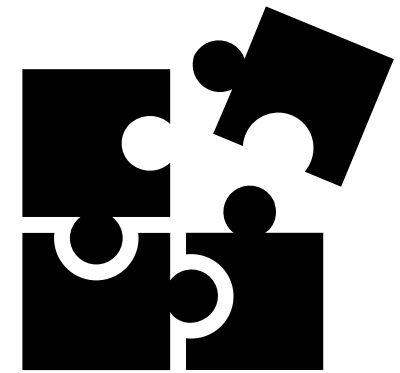
For example, our program should print 887 if we made a = 100231 and b = 62977.

```
public static int gcd(int a, int b) {  
    while (a % b != 0) {  
        int temp = a % b;  
        a = b;  
        b = temp;  
    }  
    return b;  
}
```


lecture

modular programming

- Functions allow us to apply paradigms in modular programming. Instead of copying and pasting the same block of code whenever we want to calculate something, we can break our code up into smaller “modules” and reuse bits and pieces as we see fit.
- This makes our code easier to read, easier to share, and easier to maintain while building larger programs.



Data type the function should return Function name Function *parameter*

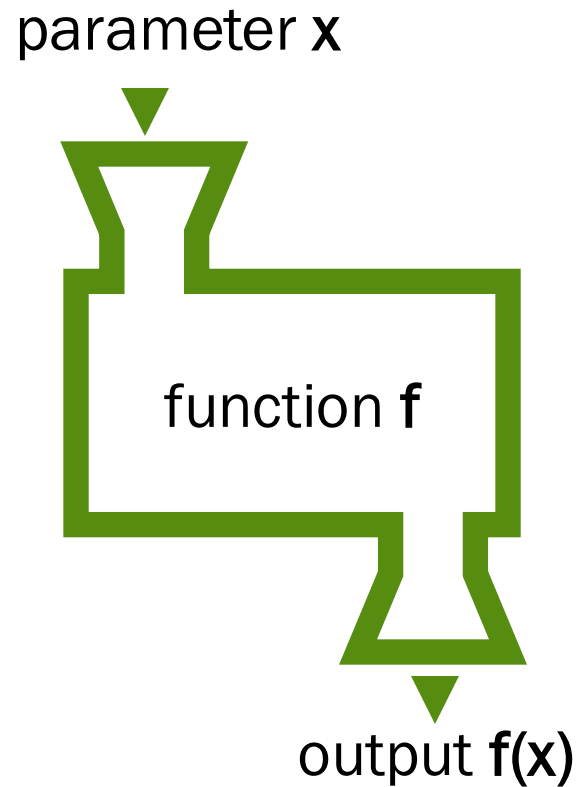


```
public static boolean f(int x) {  
    return x % 2 == 0;  
}  
public static void main(String args[]) {  
    System.out.print(f(5));  
}
```

The main function passes the number 5 onto the isEven function. isEven puts 5 in place of x. The function returns false, which is then replaced with isEven(5) and printed out.

anatomy of a function

- Java functions take zero or more input parameters and return zero or more output values.
- Functions must either contain a return statement or be declared to return type void, meaning it doesn't return any values.



It's
like
math!

scope

- Just like with loops, variables that are declared within a function can only be used inside that particular function.
- If you want to use one function's variable inside another's, you must pass it on as a parameter.

unit conversion

You are given a temperature in Fahrenheit, a weight in pounds, and a measurement in inches as command line arguments. Convert them to NORMAL units (Celsius, kilograms, centimeters). You are free to look up the equations if you'd like.

***remember this exercise
from the first week?
try writing a function
for each conversion
instead of stuffing
them all into our main
method.***



benefits of functions

- Imagine if all the functionality of your favorite app was contained within one file with only a single function. Modularity is what keeps huge, enterprise-level projects organized.
- By splitting commonly-used calculations into their own functions, it'll be easier to write future code and share our existing code.
- It also makes our code easier to debug. Since we're not copying and pasting identical blocks of code, we only need to change one bugged line contained within a function instead of potentially dozens or hundreds!

exercises

two sum

Given an array of ints and a target number, find the indexes of two numbers such that the values stored within them add up to the target number.

stonks

Given an array of integer stock prices, where `prices[i]` represents the price of a stock on the *i*th day, find the maximum profit you can make within the date range if you could only buy stock one day and sell it during another.