
Algorithms, Part I
Princeton University
**Justino's Notes**

## Welcome Notes

- **Revise Material:** Algorithms, Fourth Edition and Course Booksite.
- **Be an active participant:** write and debug code, solve problems, study available resources, engage into discussions.
- **Module 1 Material:** Introduction.

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## Course Overview

This is an intermediate-level course about programming and problem-solving using **algorithms** and **data structures**.

**Algorithm:** method for solving a problem.

**Data Structure:** method to store information.

For a professional, studying algorithms is essential for **intellectual stimulation**, **to become a proficient programmer**, **to solve problems that could not otherwise be addressed**, **to understand things**, etc.

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## Introduction Assignment

**Submission 1:** Write a program that outputs "Hello World".

```
public class HelloWorld{
  public static void main(String args[]){
    System.out.println("Hello World");
  }
}
```

**Notes:**

- Java programs need a class and a constructor method to run;
- **Public**: will be accessed by JVM (Java Virtual Machine);
- **Static:** can be executed without a class instance;
- **Void:** will not return value;
- **String args[]:** allows to pass command-line arguments.

Even if it will not be used, every Java program needs the ***String args[]*** signature.

**Submission 2:** Write a program that takes two names *(X and Y)* as **command-line arguments** and outputs "Hello X and Y | Goodbye Y and X".

```
public class HelloGoodbye {

  public static void main(String[] args) {

    String name_one = args[0];

    String name_two = args[1];

    String hello = String.format("Hello %s and %s.", name_one, name_two);

    String goodbye = String.format("Goodbye %s and %s.", name_two, name_one);

    System.out.println(hello);

    System.out.println(goodbye);

  }

}
```

**Notes:**

- There are **format specifiers** for strings in Java;

| Specifier | Meaning | Example | Result |
|---|---|---|---|
| %s | String | "John" | John |
| %d | Integer | 25 | 25 |
| %f | Float | 3.1415 | 3.141500 |
| %.2f | Two decimal cases Float | 3.1415 | 3.14 |
| %n | Line break | - | - |

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**Submission 3:** Write a program that reads a sequence of words and print one of those words randomly using **Knuth's method**.

```
import edu.princeton.cs.algs4.StdIn;

import edu.princeton.cs.algs4.StdOut;

import edu.princeton.cs.algs4.StdRandom;

public class RandomWord {

  public static void main(String[] args) {

    String champion = "";

    int count = 0;

    while (!StdIn.isEmpty()) {

      String word = StdIn.readString();

      count++;

      if (StdRandom.bernoulli(1.0 / count)) {

        champion = word;

      }

    }

    StdOut.println(champion);

  }

}
```

**Notes:**

- **Knuth's Method:** when reading the *ith* word, select it with probability 1 / *i* to be the champion, replacing the previous one.