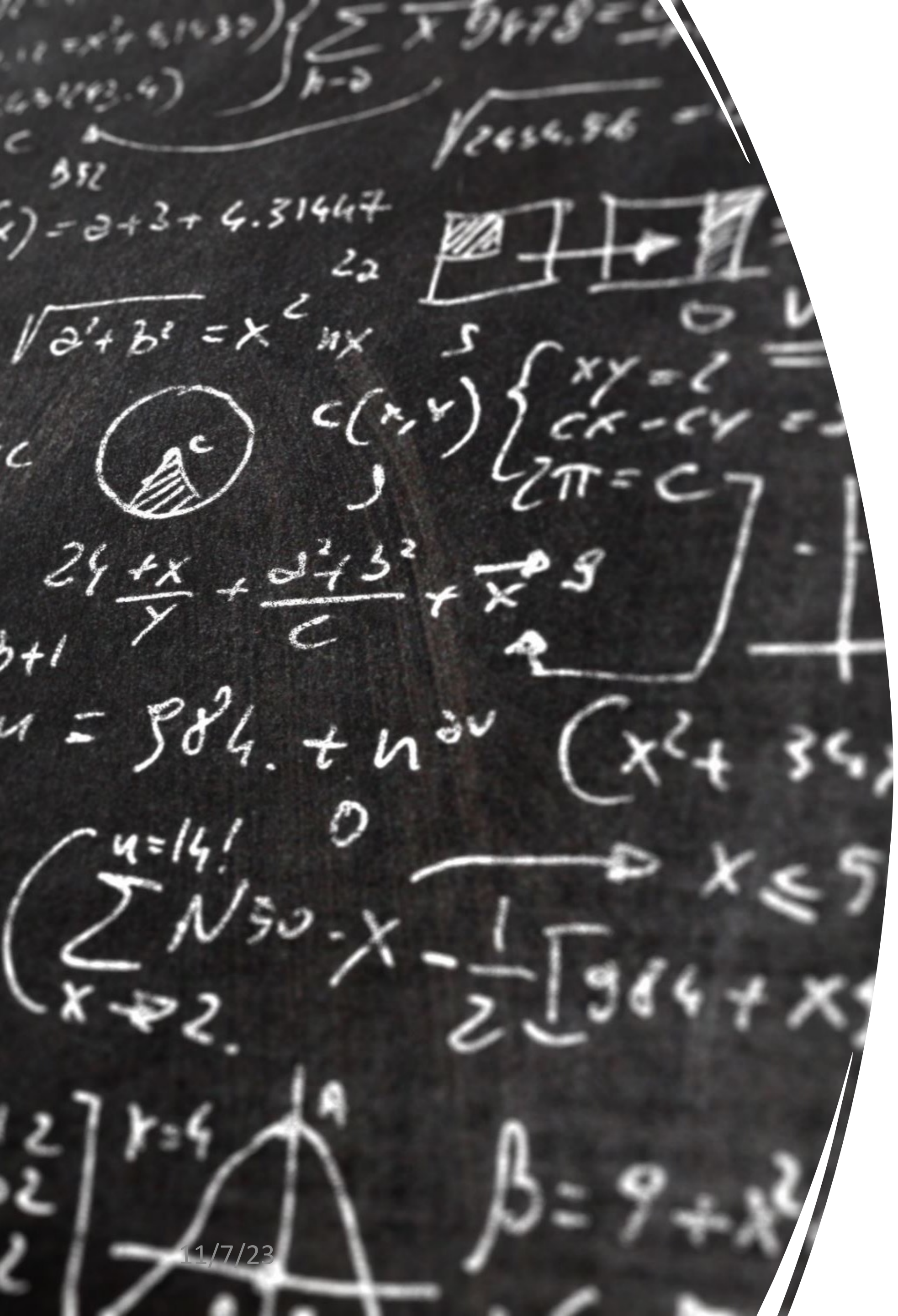


CS 113 – Computer Science I

Lecture 17 – Class Design & Arrays of Objects

Tuesday 11/07/2023

Announcements

HW07 – Due Monday 11/13

- Board game
- longer one
- Lab06 and Lab07 are relevant

HW08 – Due Monday 11/20

- Class design

Mid-semester feedback survey

Midterm 2

Tuesday 11/21

Material:

- Midterm 1 material
- Loops
- Classes & OOP

Do we want to move the midterm to be after Thanksgiving?

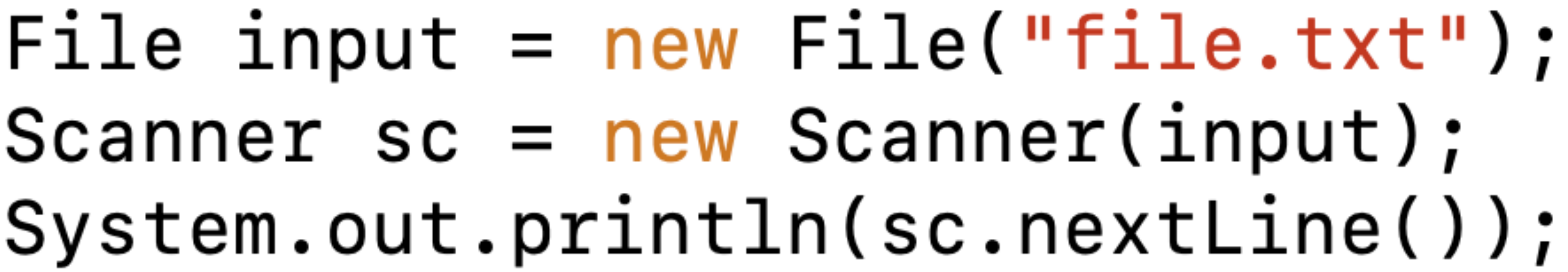
Agenda

- **Reading Files**
- Objects & Classes
- Mutability

Reading files

Use Scanner class

File class



```
File input = new File("file.txt");
Scanner sc = new Scanner(input);
System.out.println(sc.nextLine());
```

Errors

Need to either:

- indicate that the method can cause the specific `FileNotFoundException`
- Or write code to `catch` it
  - Deal with the case where the specified file is not found

More in lab

Agenda

- Reading Files
- **Objects & Classes**
- Mutability

Class

A blueprint for a custom data type

A template for how data/information is stored

Contains a set of methods for how to interact/operate on the stored data

Classes and objects

An **object** is an ***instance*** of a **class**

An **object** is to a **class** as a

cat is to an **animal**

tulip is to an **flower**

cookie it to a **snack**

Socrates is to a **human**

Defining the Bank class

```
public class Bank {
    private int size;
    private String name;
    private String[] clients;
    private double[] accounts;

    public Bank(String bankName, int numClients) {
        name = bankName;
        size = numClients;
        clients = new String[size];
        accounts = new double[size];

    }
    public String getName() {
        return name;
    }

}
```

Bank Actions

How can we find out how much money the bank is holding at once?

How can we find out which account is currently overdraft?

What other questions might the bank want to know?

Exercise: Bank Account

BankAccount should have the following data:

- Name
- Amount

BankAccount should have the following operations:

- currentBalance() // returns current amount in the bank account
- withdraw(float amt) // withdraw the given amount from the account
- deposit(float amt) // deposit the given amount to the account

this

`this` is a special keyword that refers to the object inside an instance method

Allows us to access other instance variables within an instance method

Access modifiers

Specify the access-level of instance variables/methods

- `public`
  - code outside of the class can access the variable/method
- `private`
  - code outside of the class cannot access the variable/method

Default in java is `public`

In this class, make instance data private

Revisiting the Bank class

```
public class Bank {
    private int size;
    private String name;
    private String[] clients;
    private double[] accounts;

    public Bank(String bankName, int numClients) {
        name = bankName;
        size = numClients;
        clients = new String[size];
        accounts = new double[size];

    }
    public String getName() {
        return name;
    }

}
```

Revisiting the Bank class

```java
public class Bank {
    private int size;
    private String name;
    private BankAccount[] accounts;

    public Bank(String bankName, int numClients) {
        name = bankName;
        size = numClients;
        accounts = new BankAccount[size];

    }
    public String getName() {
        return name;
    }

}
```

Agenda

- Reading Files
- Objects & Classes
- **Mutability**

Mutable vs Immutable

Mutable:

Values can change

Immutable:

Values cannot change

Strings and Integers are immutable