Writing Classes

Writing a `Geometry` Class

Lecture Contents

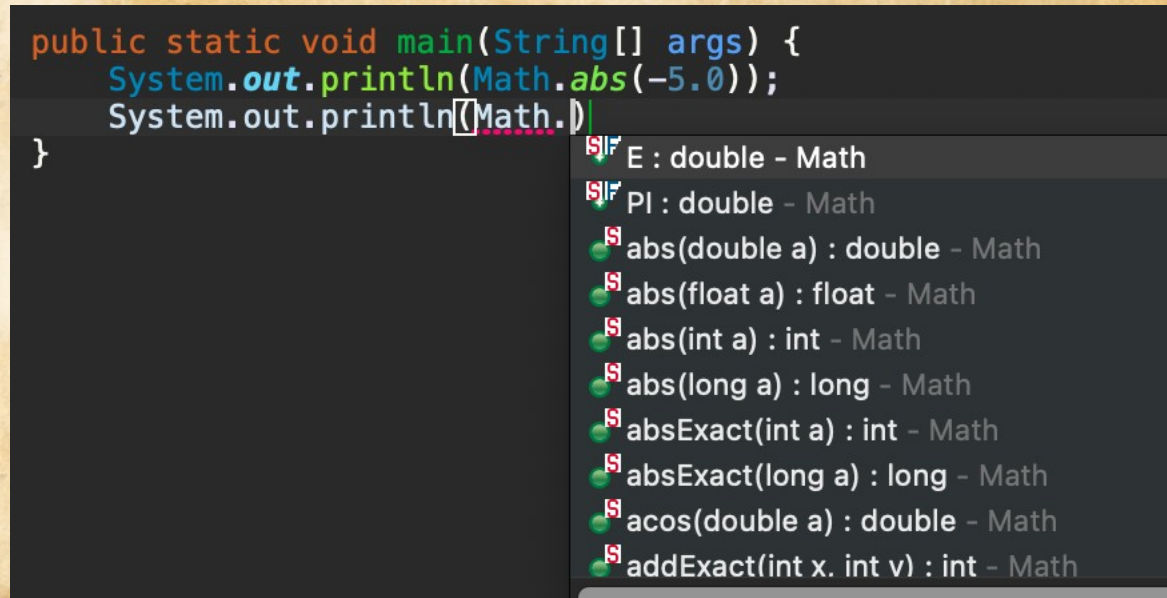
- Review:
  - Java Class Library
  - `Math` Methods and Constants
- Writing a Class
  - `Geometry` Class

Java Class Library

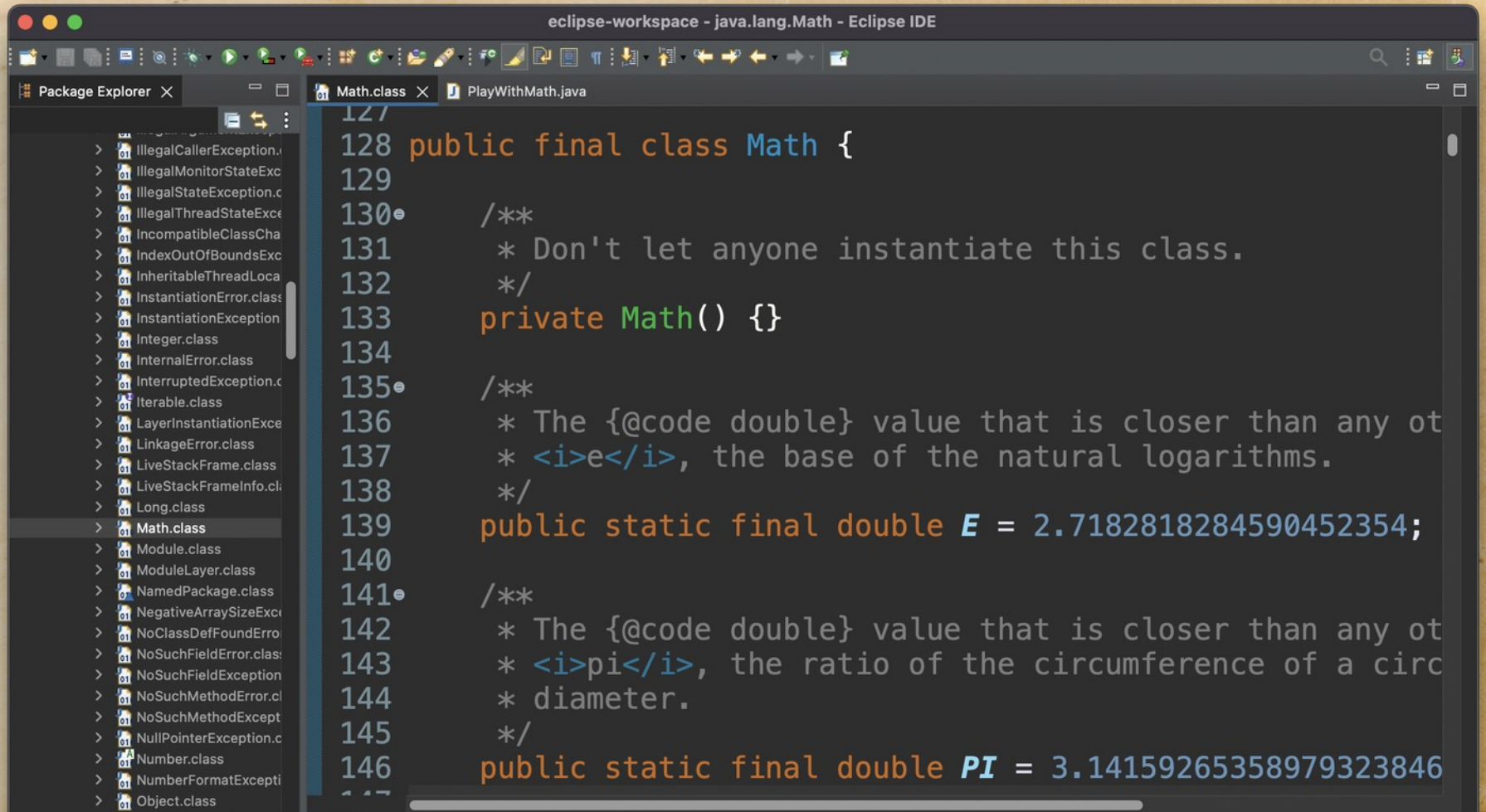
- Java Class Library (JCL) is part of the Java Development Kit (JDK)
  - A comprehensive collection of pre-built classes and methods
  - Provides essential functionality for Java applications
  - Includes functionality in classes, for example:
    - `Math` (which we'll discuss in this slide show)
    - `Array` (sorting, etc.)
    - `File` (for file I/O)
    - `String` (operations on strings of characters)
    - `ArrayList`
    - `HashMap`

`Math` Methods and Constants

- **Methods**
  - **`Math.abs(-5);`**
  - **`Math.sqrt(2.0);`**
  - `Math.min(3, 5);`
  - `Math.max(3, 5);`
  - `Math.sin(3.14);`
  - `Math.asin(0.5);`
  - **`Math.pow(2, 5);`**
  - **`Math.random();`**
- **Constants**
  - **`Math.PI`**
  - `Math.E`



- You can view the code of the `Math` class and compare it to the classes we write.



Vocabulary - ***refactor***

- To ***refactor*** is to improve the internal structure or design of existing code without changing its behavior.
- *Refactoring* includes:
  - **Renaming** variables, methods or classes to make their purpose more clear
  - **Reorganizing code** to improve structure or readability
  - **Extracting** methods to simplify code (break it into smaller parts)
  - **Consolidating** code by moving duplication into common methods
  - **Improving comments**
  - **Optimizing** algorithms
  - Replacing ***magic numbers*** (literal numbers) with constants.
  - **Simplifying** conditional expressions, loops, etc.

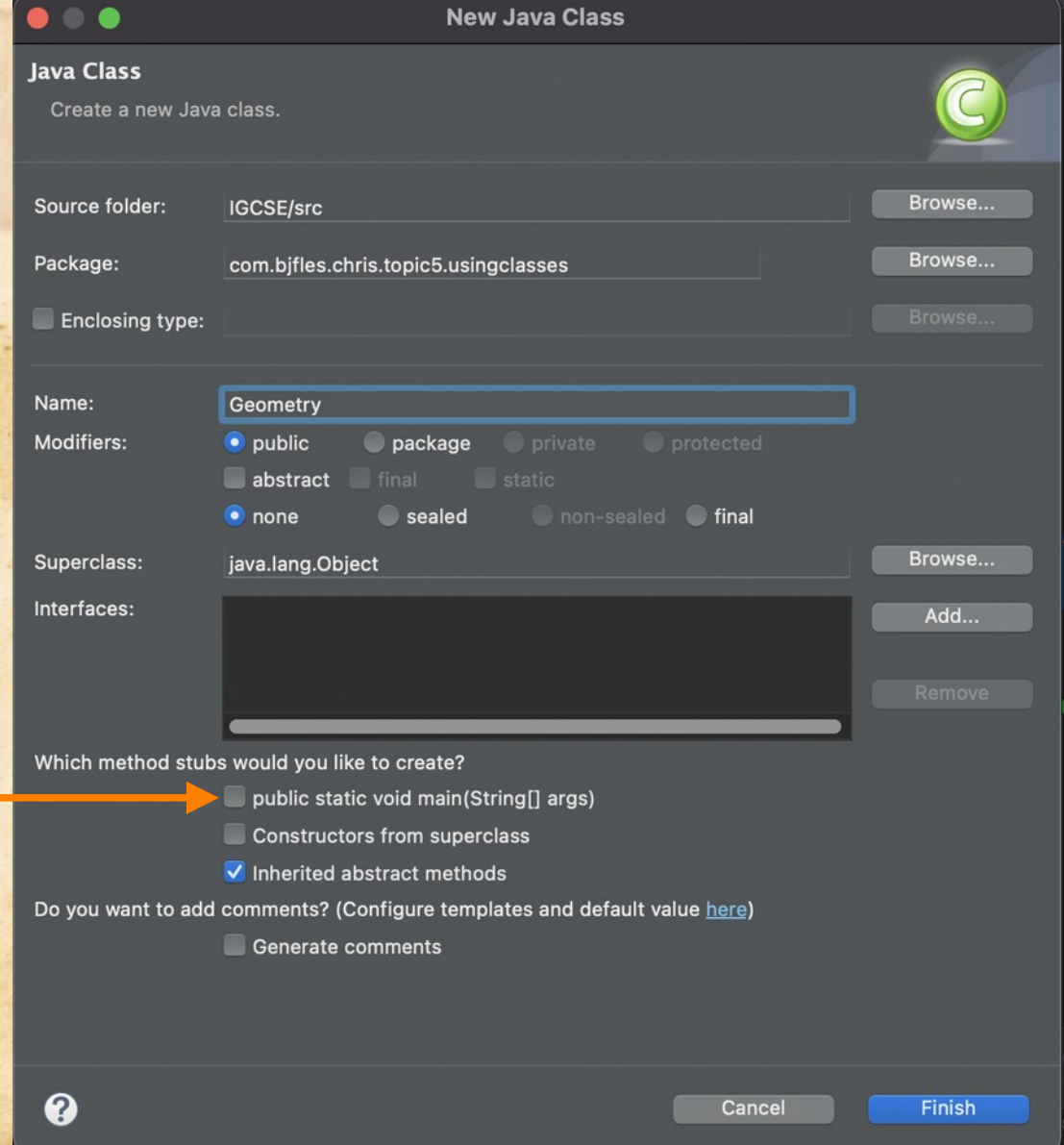
Refactoring `Geometry` Class

- To ***refactor*** is to improve the internal structure or design of existing code without changing its behavior.
- We will ***refactor*** the code from `UsingMathClass` into two new classes:
  - A `Geometry` class
  - A `UsingGeometryClass` class.
- This is an exercise in separating code that serves a common function into its own class.

`Geometry` Class

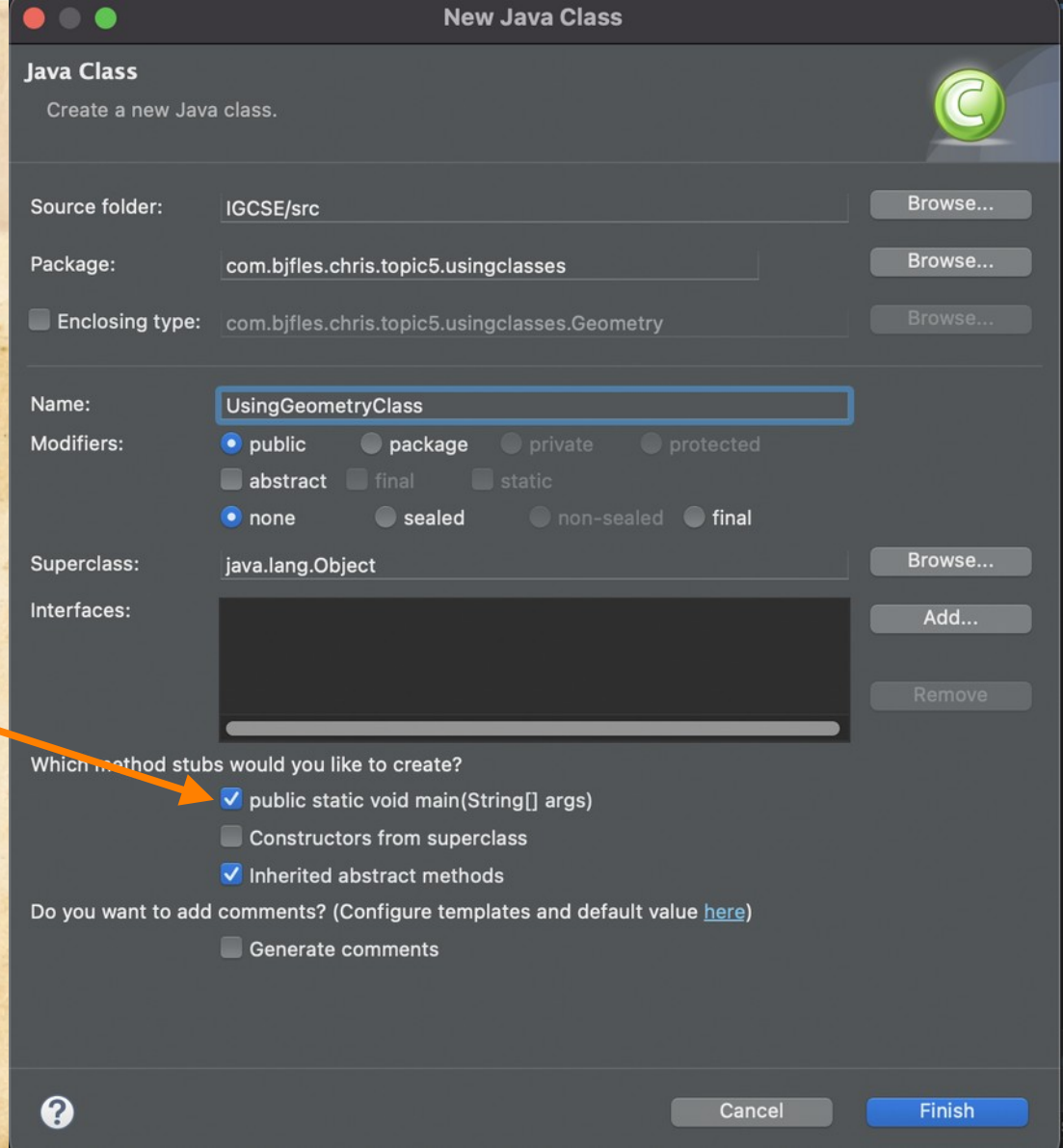
- Create a new `Geometry` class, but do ***not*** add a `main` method.

Selecting this will add template code for the **`main`** method, which is where the Java program will start running.



`Geometry` Class

- Create a second class named `UsingGeometryClass`, this time *do* add a `main` method.
  - The `Geometry` and `UsingGeometryClass` must be in the same package for this exercise.



Refactoring `Geometry` Class

- Move your methods `calculateCircumference` and `hypotenuseLength` from your `UsingMathClass` into your `Geometry` class.
- Copy the code from your `main` method in `UsingMathClass` into your `UsingGeometryClass`.
- Append "`Geometry.`" to the beginning of each method call in your `main` method in the `UsingGeometryClass` so that the compiler knows where to find those methods.
- Run `UsingGeometryClass` and ensure it is working correctly. The output should be the same as it was for your `UsingMathClass`.

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