ALGONQUIN COLLEGE

OBJECT ORIENTED PROGRAMMING (JAVA) (CST8284)

LAB 4

UNIT TEST FRAMEWORK (Java Unit Test – JUnit 4)

Marks: 5%

Important Information

To be successful in this lab:

- Ensure that you **review the hybrid tasks** for Week #4 **first before** starting off with this lab exercise.

- Review the **helpful video** included in the **Hybrid for Week #4** in Brightspace page to enrich your learning experience.

Some Introduction

The essence of this lab is to learn about, and use a **unit testing** framework.

- Unit testing frameworks are used to **execute** and **evaluate** test suites, as well as make it easy to add test cases.
- In this lab we will use the **JUnit 4**
- Available at: https://junit.org/junit4/

You do not need to install JUnit if using Eclipse

Some Introduction (2)

- In **JUnit** testing, you design a **test case** for **each class** you develop.
- A **method** is provided for each of the test cases you wish to run.
- Test methods are annotated. **Annotations** are used to **mark** the test methods (advanced Java features that place markers in the code, which is interpreted by another tool).
- In JUnit, **@Test** annotation is used to mark methods. Other methods may exist in the text class without @Test (e.g. methods performing steps to be shared among test methods).

Some Introductions (3)

- For each test case, conditions can be computed to check if **true**.
- Result is passed to a method (`assertEquals` method) that sends it to the framework.
- The `assertEquals` method takes the **expected** and **actual** values as **arguments** (for floating point numbers it takes a **tolerance** value). Method fails if the two given values are unequal.
- It is **good practice** to end the name of the test class with "**Test**", for example: `CovidTest`

Some Introductions (4) - Assertions and their definitions

From your Hybrid tasks for this week, what **assertions** can you **identify** that are used in JUnit testing methods? What are their descriptions?

Hint: assertNull(…), assertNotNull(…), assertTrue(test), assertFalse(test), assertSame(…), etc.

PART 1

YOUR TASKS USING THE CODE PROVIDED

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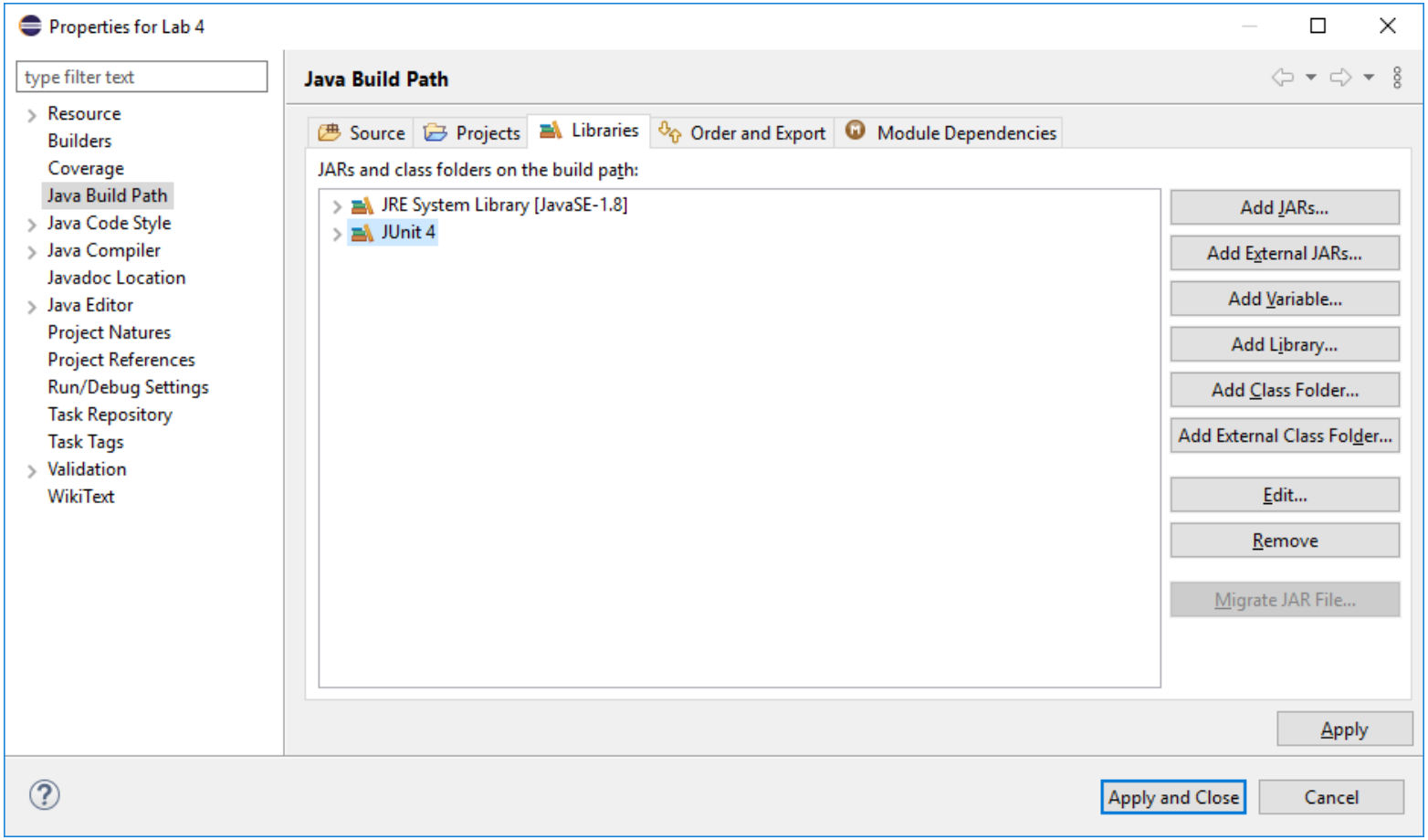
You are Required to…

- **Inspect** the code files that you received and **load them** into eclipse (Lab 4)
- Check to ensure that you have **JUnit 4** appropriately **set up** in your eclipse.
- Do the following if you need to **correctly set up JUnit 4** in eclipse:
  - Go to **Package Explorer** at the top bar of your eclipse editor

You are Required to… Ensure Correct set up of JUnit 4

- Click on **Project**
- Scroll down to **Properties** on the menu
- Scroll down to **Java Build Path** on the menu and click on it.
- From **Libraries,** Select **Add Library (**from the list on the right-hand side of that page)
- Select **Junit (and then JUnit 4** from menu**)**
- Click **Apply and Close**

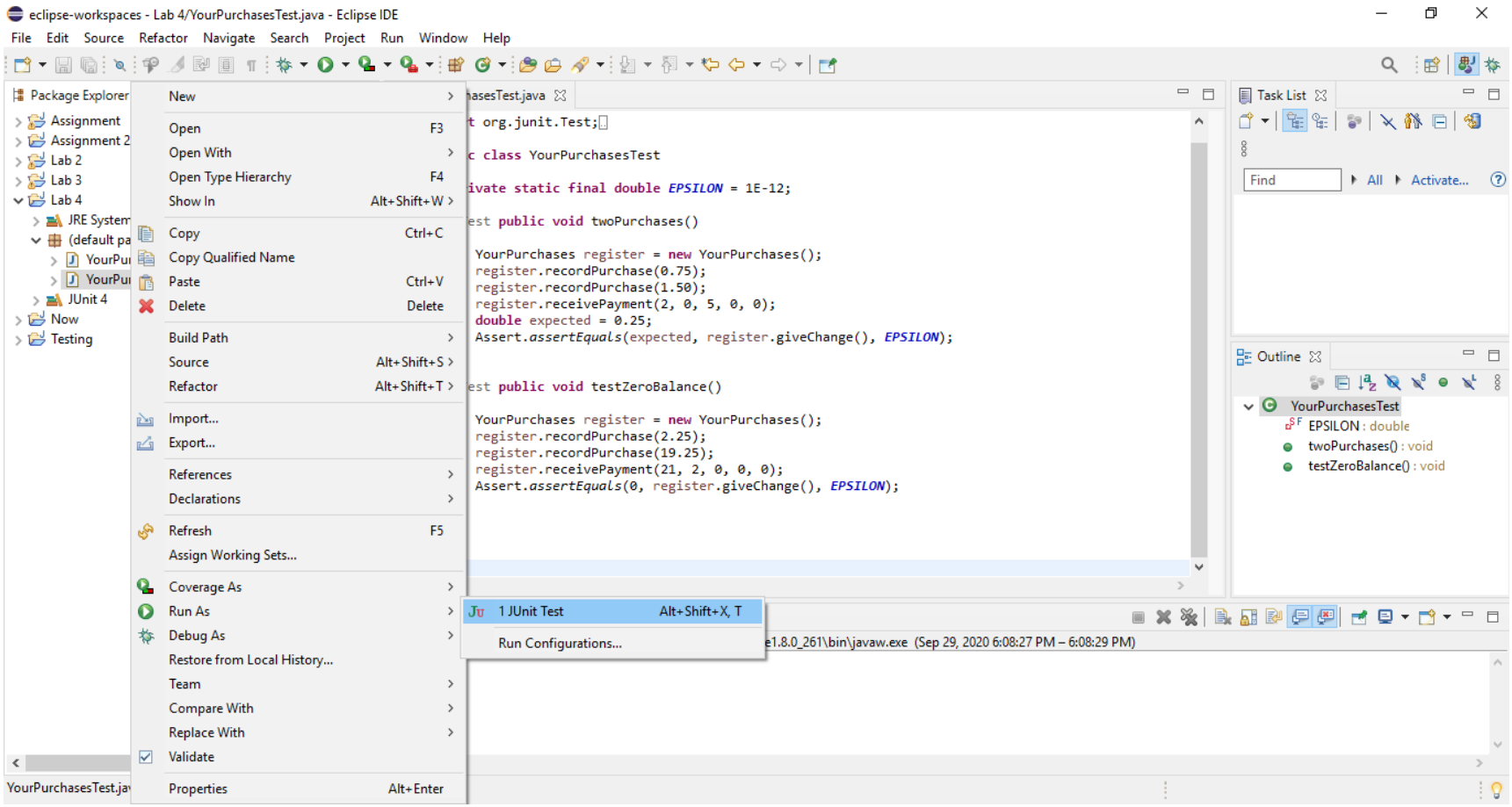
You are Required to… Ensure Correct set up of JUnit 4 (2)



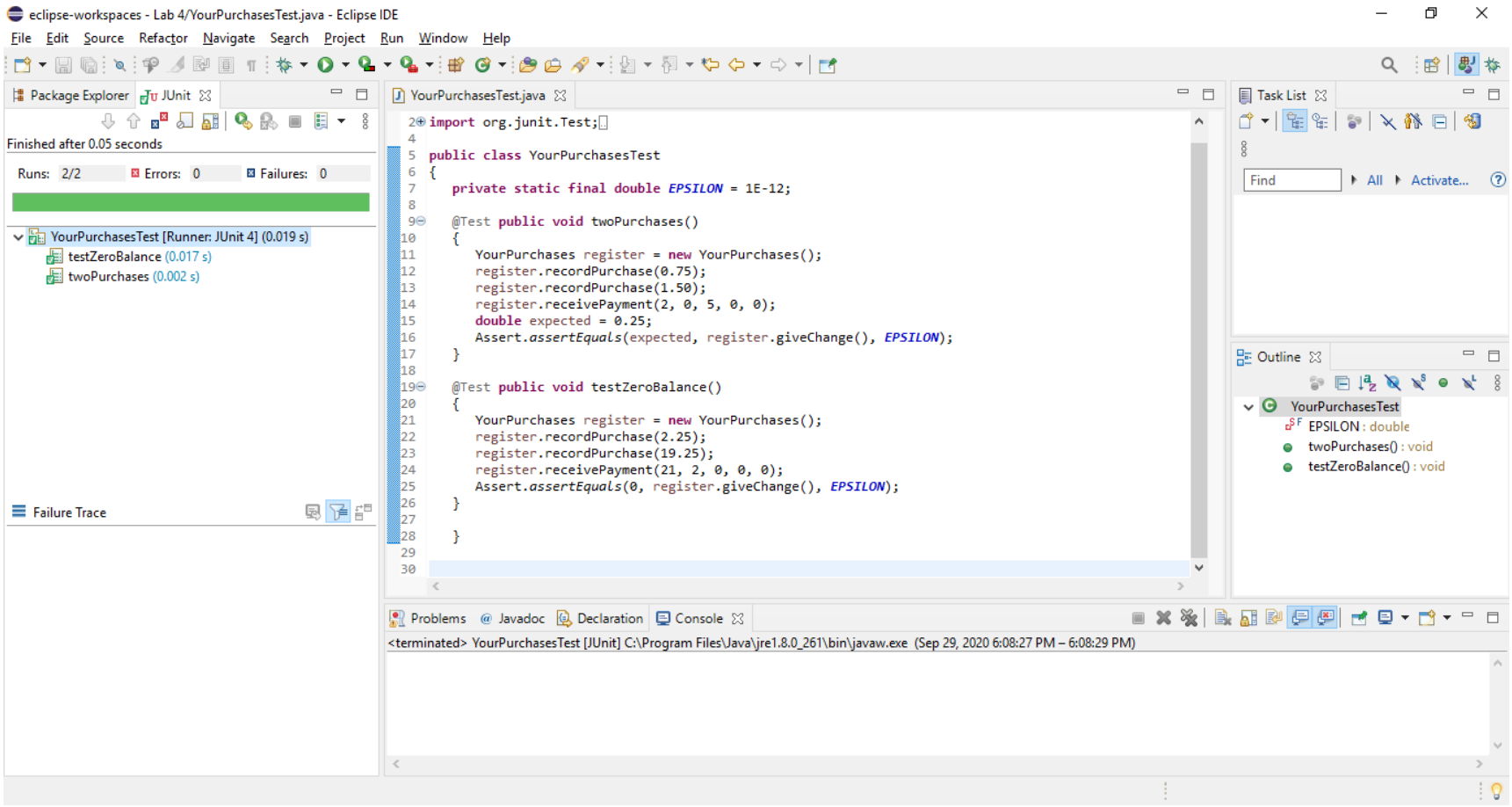
Execute your Code as Junit Test

- To execute, **right click** on the **YourPurchasesTest** and select **Run As,** and then **JUnit Test** (as shown in slide 13)
- When your execution is **successful**, a **green bar** shows in the panel in eclipse, cataloging **Runs, Errors and Failures** (see slide 14)
- When **unsuccessful**, a **red bar** shows in the panel and the catalog of Runs, Errors and Failures (see slide 15)

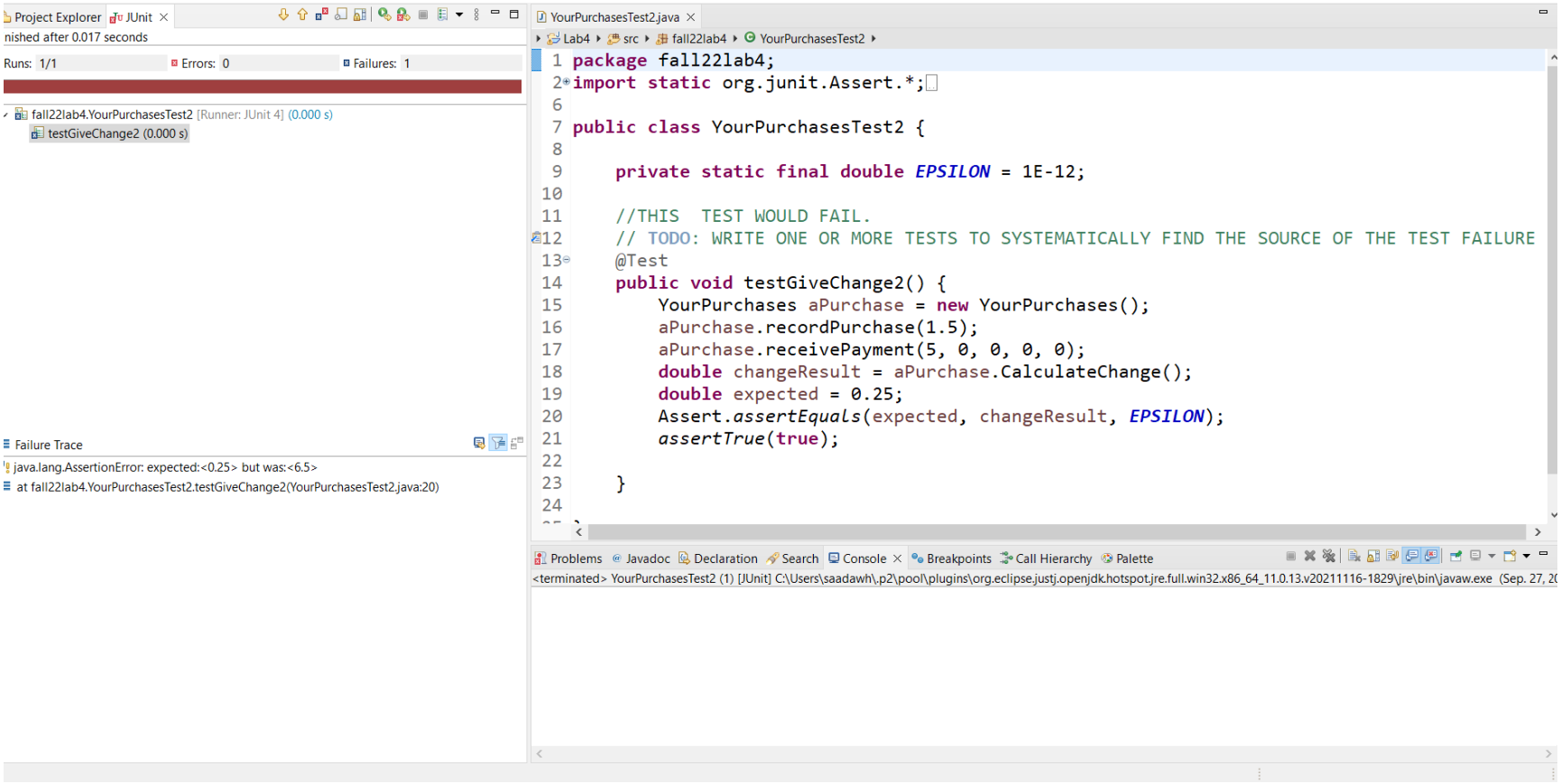
Execute as JUnit Test



When your run is successful…



Error is encountered: unsuccessful run



Demo: Part 1

- **Run** the code provided to you (**YourPurchases.java** and **YourPurchasesTest.java**) to show **GREEN BAR**
  - **Explain** the output on your eclipse screen to your professor
- **Run** the code provided to you (**YourPurchases.java** and **YourPurchasesTest2.java**) to show **RED BAR**

PART 2

CREATING NEW TEST CASES

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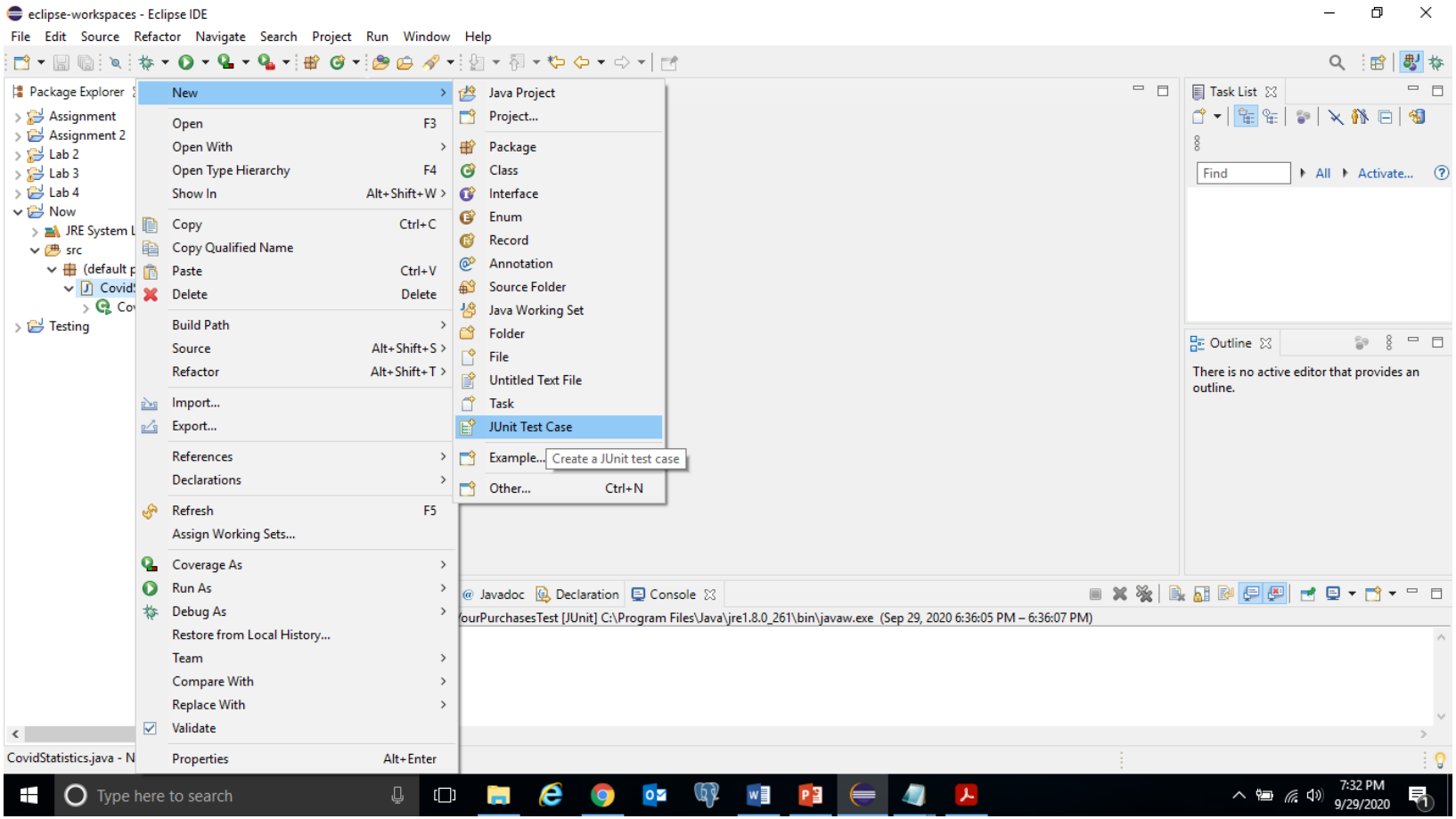
Create a New Test Case

- In your eclipse editor, select the source code for which the Test case is required (use **YourPurchases.java**)
- Make a **right click** on the source code file to display a long menu window (as shown in next slide).
- At the **top** of the menu, select **New,** and then scroll down to select **Junit Test Case**

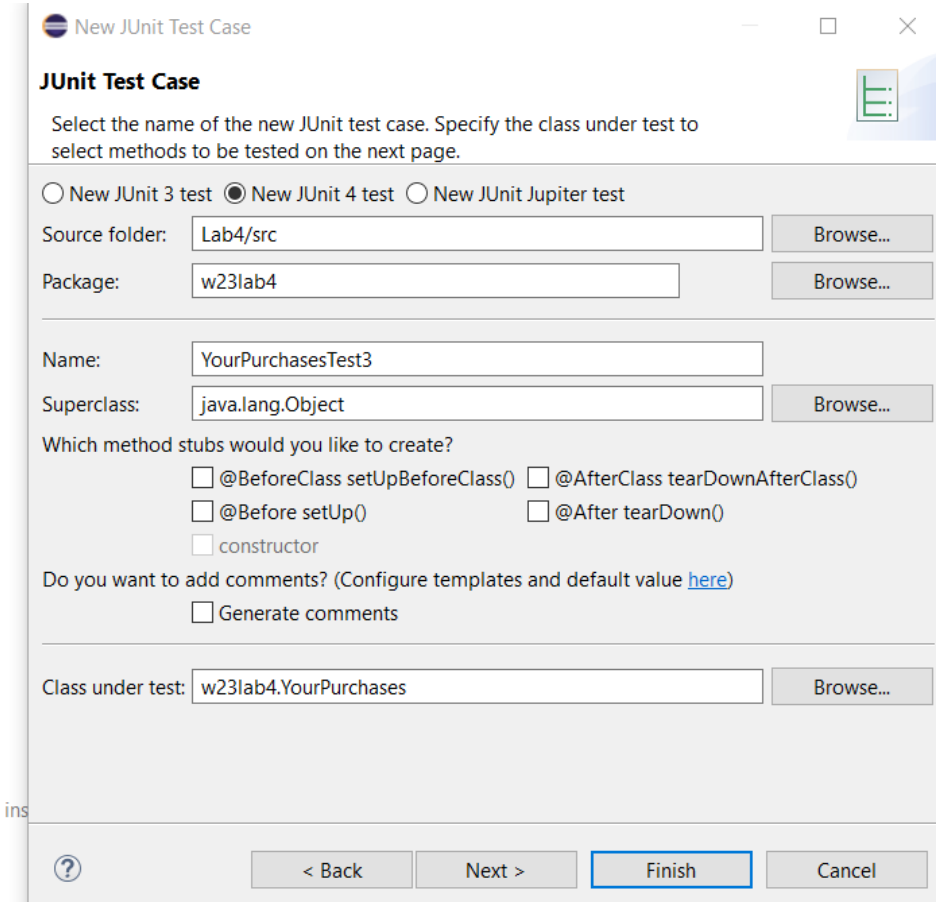
Creating a New Test Case (2)



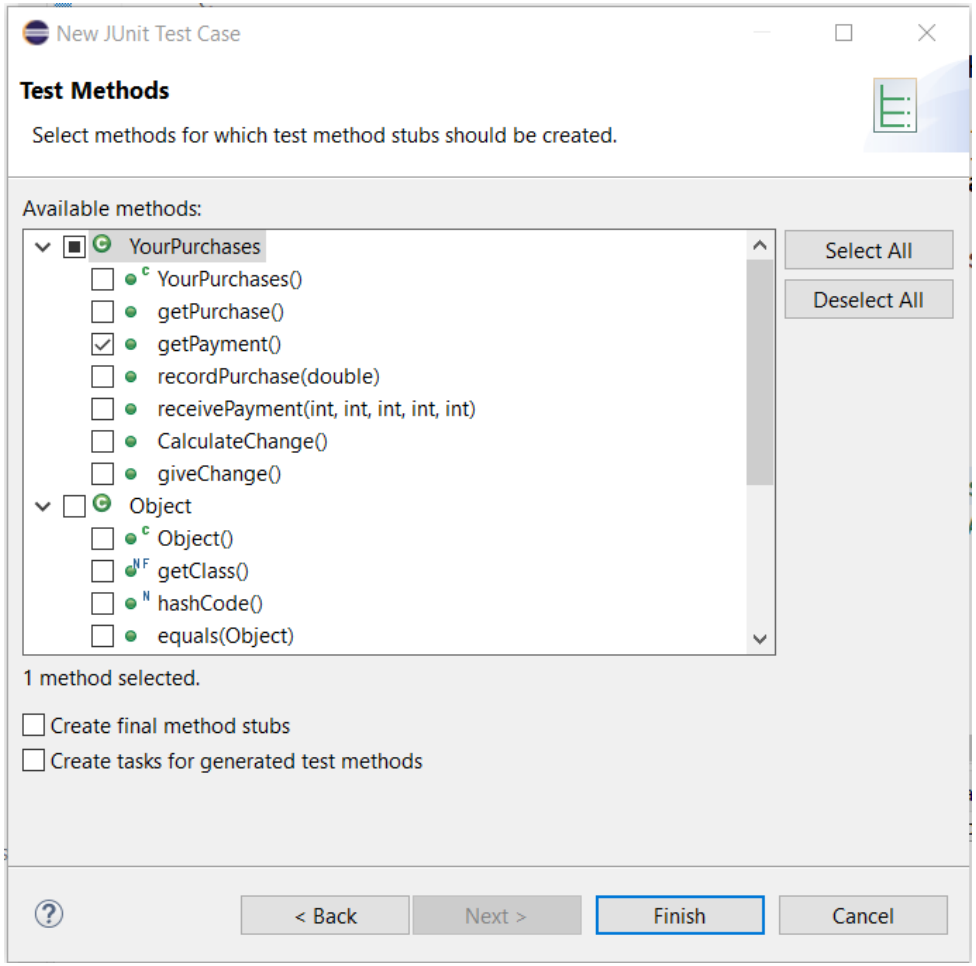
Creating a New Test Case (3)

- In the New JUnit test case window, ensure to select the **New Junit 4 Test**
- Select the **Package** (default packages are discouraged – always name your package
- Enter the **Name** (ending with “Test”)
- Click **Next** to select the **methods** for which your test cases are required (see picture slide below) and then click **Finish**

Creating a New Test Case (4) - Example



Creating a New Test Case (5) - Example



Part 2 – To Be Announced in Lab Session

Grading Rubrics

- Successfully configuring your Junit 4 test environment and running the provided code to show **GREEN BAR** – 0.5%
- Successfully introducing an error/failure into the code provided to show **RED BAR** – 0.5%
- Successfully **writing your own tests** into the **YourPurchasesTest** code file (see instructions in the code) – 1.5%
- Successfully **creating a new tests as needed in part 2** and **answering** relevant questions – 2%
- Correctly **including Javadoc comments** into the test file provided to you – 0.5%

References

- Java How to Program, Early Objects Plus MyProgrammingLab with Pearson eText -- Access Card Package, 11/E. Author: Deitel ISBN: 9780134800271

- Big Java Early Objects, 7/E. Author: Horstmann, C. Wiley. ISBN: eText: 978-1-119-49909-1 or loose-leaf paper: 978-1-119-74020-9.