CS2230 Computer Science II: Data Structures
Homework 1
Intro to Java

This homework assumes you have completed Prelab1 and Lab1. Do not attempt the homework until you have completed those satisfactorily. Get help early if you need it.

Goals for this assignment

- Recognize Java syntax
- Use Java to solve some problems

Submission Checklist

You should submit the three .java files specified in this document. Upload them on ICON under Assignments > Homework 1. Physical paper copies are not accepted.

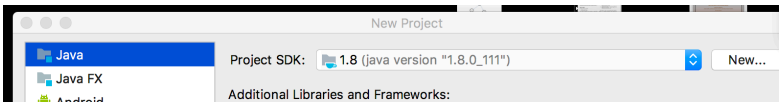
How do I find my .java files on my computer to turn them in? In the project tree on the left-hand-side of IntelliJ it shows the path on your computer where the project lives. It should have a folder named src/ where the files are.

Follow this checklist when submitting.

- Does AbsMax.java run as required?
- Does BaseCheck.java run as required?
- Does MaxBoth.java run as required?
- For each program, the only changes you made were (1) filling in code in the required method, (2) optionally adding your own private methods, and (2) optionally adding more test cases.
- Did you submit all of those files to ICON?
- **Now, download the files you just submitted to make certain they are the right versions! This is your responsibility.**
- **DO NOT** rename .class files to .java and turn those in.

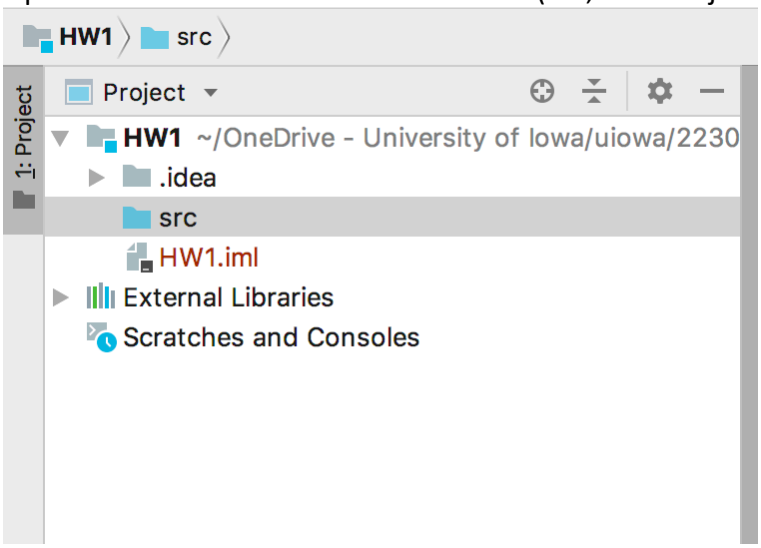
Setup

1. Open IntelliJ.
2. Create new Project
3. Choose Java. Your Project SDK version may differ (might be 10 or 11)

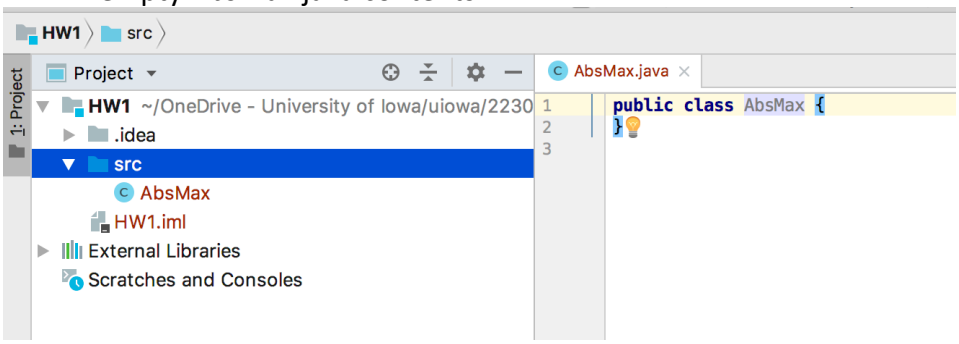


4. Click next until you are asked for project name and location. Put a reasonable name like HW1 for project name. You may optionally change the project location, but we recommend you leave it as is.
5. Finish.

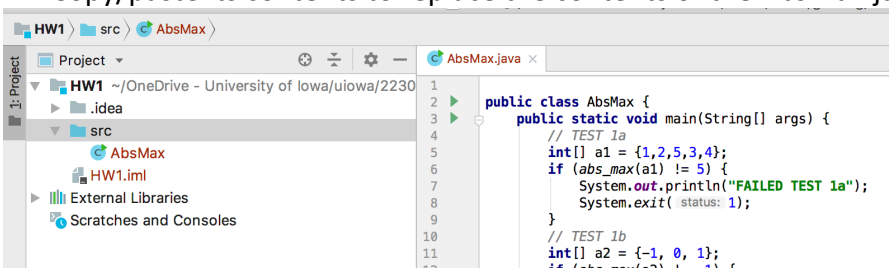
Open the src folder on the left hand side (i.e., the “Project tree”)



6. Right click src and choose New Java Class. Name it exactly AbsMax. You should now see AbsMax.java underneath src/ in the Project tree and a text editor showing the mostly empty AbsMax.java contents.



7. Open AbsMax.java from hw1.zip in your favorite plain text editor (e.g. notepad). Copy/paste its contents to replace the contents of the AbsMax.java in IntelliJ.



8. Click Run | Run... | AbsMax.java. After a moment you’ll see the following output in the console at the bottom of IntelliJ.

```
FAILED TEST 1a
```

9. Repeat steps 6-8 for BaseCheck.java and MaxBoth.java.

Problems

Problem 1 (10 points)

Write a method `abs_max` that takes an array as an argument and returns the integer with the maximum absolute value. In the case of ties, take the integer that appears earliest in the array. Here are some example cases.

[1,2,5,3,4] => 5
[-1, 0, 1] => -1
[1, 0, -1] => 1
[3, -1, 5, -6] => -6

Implement your solution in the file we have provided: `AbsMax.java`. Your program should run and print only "Tests pass" in the console. It is your responsibility to make sure the program runs properly in IntelliJ.

Problem 2 (10 points)

A base-paired DNA sequence is one where A's line up with T's and G's line up with C's. For example:

base-paired DNA sequence
ATCGAT
TAGCTA

If A is not paired with T, T with A, G with C, or C with G, then the sequence is not base-paired. For example:

not a base-paired DNA sequence
ATCGAT
TAGCAA

not a base-paired DNA sequence
ATCGAT
TATCTA

A base-paired sequence also needs both sides to have the same length. For example,

not a base-paired DNA sequence
ATCG
TAGCTA

Write a method `base_check` that takes two arrays of characters as arguments and returns true if and only if the DNA sequence represented by the arrays is base-paired.

Implement your solution in the file we have provided: `BaseCheck.java`. Your program should run and print only "Tests pass" in the console. It is your responsibility to make sure the program runs properly in IntelliJ.

Problem 3 (10 points)

Write a method `max_both` that takes two arrays of positive integers as arguments and returns the maximum integer found in both arrays. If not duplicates are found it returns -1. For example:

[2,4,6,8,10,12,14]
[7,7,5,4] => 4

[2,4,6,8]
[3,5,7] => -1

[7,6,22,4,4]
[4,5,5,25,6] => 6

Implement your solution in the file we have provided: `MaxBoth.java`. Your program should run and print only "Tests pass" in the console. It is your responsibility to make sure the program runs properly in IntelliJ.

Helpful Tips

- What do I do if my program prints the following?

```
FAILED TEST 1
```

This message means that your method didn't return the correct answer for the test 1a. You must debug your program. Go look at TEST 1 in the `main()` method and make sure you understand the test case. Try printing out the values of variables at different parts of the program to see if it is what you expected. Print statements look like `System.out.println(...)`