Homework 5: Hash Map

Due: See T-Square

Important

There are general homework guidelines you must always follow. If you fail to follow any of the following guidelines you risk receiving a **0** for the entire assignment.

1. All submitted code must compile under **JDK 8**. This includes unused code, so don't submit extra files that don't compile. (Java is backwards compatibile so if it compiles under JDK 7 it *should* compile under JDK 8.)
2. Do not include any package declarations in your classes.
3. Do not change any existing class headers, constructors, or method signatures.
4. Do not add additional public methods when implementing an interface.
5. Do not use anything that would trivialize the assignment. (e.g. don't import/use `java.util.LinkedList` for a Linked List assignment. Ask if you are unsure.)
6. You must submit your source code, the `.java` files, not the compiled `.class` files.
7. Code exactly what is asked for. No more and no less.
8. After you submit your files redownload them and run them to make sure they are what you intended to submit. You are responsible if you submit the wrong files.

Hash Map

In this homework, you will implement a key-value Hash Map with a linear probing collision policy. A Hash Map maps keys to values and allows O(1) average case lookup of a value when the key is known. This Hash Map must be backed by an array of initial size 10, and must double in size when the table exceeds (greater than, not greater than or equal to) a load factor of 0.67. These values are provided as constants in the interface and should be used within your code.

The table should not accept duplicate keys, but **duplicate values are acceptable.**

Neither keys nor values may be null.

Hash functions

You are not expected to write your own hash functions for this assignment; use the `hashCode()` method (every `Object` has one). If this is a negative value, use the absolute value of it.

Provided Files

The following files have been provided to you.

1. `HashMapInterface.java` This is the interface your HashMap should implement. All instructions for what the methods should do are in the Javadoc. **Do not alter this file.**
2. `HashMap.java` This is the class in which you will actually implement the interface. Feel free to add private helpers but **do not add any new public methods.**

3. `Gradable.java` This is the interface for grading purposes. The HashMap class must implement this interface. All instructions for what the methods should do are in the Javadoc. **Note that what you return for the toArray method should be the entire backing array, including the empty spaces. Do not alter this file.**

4. `MapEntry.java` A class representing an entry in a HashMap. **Do not alter this file.**

Deliverables

You must submit all of the following file(s). Please make sure the filename matches the filename(s) below. Be sure you receive the confirmation email from T-Square, and then download your uploaded files to a new folder, copy over the interfaces, recompile, and run. It is your responsibility to re-test your submission and discover editing oddities, upload issues, etc.

1. `HashMap.java`