Program #5: Set ADT
CSE 464/564

Create a Java class to implement the following Set ADT that is intended to capture finite mathematical sets.

public class Set<Item>

	Set()	create an empty set
void	add(Item item)	put item into the set
void	remove(Item item)	removes item from this set if it is there; otherwise throw exception
Set<Item>	union(Set<item> thatSet)	creates a new set that is the union of this and thatSet
Set<Item>	intersection(Set<item> thatSet)	creates a new set that is the intersection of this and thatSet
Set<Item>	difference(Set<item> thatSet)	creates a new set that is the set difference of this and thatSet. This is, all of the elements of this that are not in thatSet
boolean	contains(Item item)	Is the item in this set?
boolean	isEmpty()	Is this set empty?
int	size()	number of items in this set
int	hashCode()	returns a valid hash code from this set
Iterator(Item>	iterator()	returns an iterator that allows you to see the elements of the set
String	to(String()	returns a String that represents this set in the typical set notation
boolean	equals(object O)	returns true if the elements of this are the same as those in object O

You should pick an underlying data structure that makes sense to implement these operations efficiently. In particular, operations like add(), remove(), and contains() should operate in better than linear time. There is a Java Set class. Do not use this in your implementation.

You should include Junit tests to thoroughly test these operations. Furthermore, you should include *coverage* tests to show that you have thoroughly tested.

Coverage: Install the coverage tool *EclEmma* coverage tool. You can do this from the help menu of Eclipse. Choose the Marketplace option. Search for *EclEmma* and install it. See this web site for more information about this tool: https://www.eclemma.org/userdoc/coverageview.html

What to turn in:

- Java code for the Set class and the Junit test class
- A picture of the screen showing that your code passed all of the Junit tests. That is, they should all be green. Open up the green bar to show all of the individual tests.
- A picture of the coverage to show the details of your coverage
- A pdf file describing:
    - Why you picked the underlying data structure that you did.
    - What is the time analysis of each of your methods.