Comp 282 Project #2 (20 pts)

Due: Sept 30 (upload MaxIntHeap.java file to Moodle by 9:00 am)

(hand in hard copy of all files and test cases in your class on Sept 30)

1. Implement the class MaxIntHeap using an array as the container to hold data items. Do not use any JCF classes to solve the problem.

```
public  class MaxIntHeap
{
   public MaxIntHeap()  {  }  // set array size to a default value of 20

  public MaxIntHeap( int m) {    }   //constructor that sets max size of array
  public boolean isEmpty(){  }

   public int size() {  }

   public void heapInsert(int v) throws HeapException {   }

   public int  removeMax ()throws HeapException  {   }

   public int max() throws HeapException  {   }


 public void modifyHeap(int k , int newvalue) throws HeapException { }

// Changes value of kth index of heap to newvalue

//AND efficiently adjusts heap so that heap remains a heap


 public int[]  getHeapArray(){  }

 // return a truncated COPY of array holding heap values. See below.


}
```

2. Create a HeapTest class to test your code. Insert at least 10 values in heap. Test all heap operations in several different orders. Test the HeapException everywhere it a HeapException can be thrown.

3. Notes on the Heap class

a. HeapExceptions are thrown by max() and removeMax() when the heap is empty. HeapExceptions are thrown by heapInsert when the array hold the heap is full. HeapExceptions are thrown by heapModify(k,newvalue) when k <0 or k> lastindex. Your error messages for exceptions must be very informative.

b. getHeapArray() Must return a truncated copy of the array holding the heap values. It must return only the actual values in the heap. This means that the returned array will be indexed from 0 to *lastitem*. This method is critical for testing. If this doesn't work correctly you will likely get 0 points on testing.

c. heapModify(k, newvalue) must adjust the heap in O(log n) time.

4. Create **three** java files: MaxIntHeap.java, HeapException.java, HeapTest.java.
    a. Hand in hard copy of all three files plus sample run from HeapTest.java.
    b. Submit **MaxIntHeap.java** (ONLY) to Moodle. Instructor will test this file.