NAME:_____

1. (12) Write the Java code for a method named **maxChar** that receives two char arrays of the same size as arguments and returns a newly created array of type char. Each element of the new array that is returned is the larger (based on the ASCII code) of the corresponding elements of the two arrays received. For example if [‘x', '3', '?'] and ['7', '4', 'e'] were passed to **maxChar**, it would return the array: [‘x’, ’4’, ‘e’]. Or, if ['6', 'f', 'n'] and ['S', 'u', ','] were passed to **maxChar**, then [‘S’, ’u’, ’n’] would be returned.

2. (12) Write a list of all the values that **s** is assigned in the course of the following computation:

```
String s = "Java Programming";
int j = s.indexOf("av");
int k = s.indexOf('m',j+1);
s = s.substring(j,k);
s = s+s.charAt(2)+s.charAt(s.length()-2);
```

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3. (10) Given the array of numbers below, show all the steps as you perform a binary search, looking for the **key** of **11**

```
int[] nums =  {9, 15, 23, 67, 78, 85, 111, 117, 135, 225, 829, 1000};
```

Enter into the table to the right the low, mid and high values as the binary search progresses. DO NOT write any code. You may use either the subscript (index) values or the actual number stored at the subscript. Not all rows of the table below may be needed.

Low	Mid	High

4. (12)

WHICH DO YOU PREFER?

The table to the right represents the number of credits required to be at a specific level in college. For example, if you have 32 credits you're a Lower Sophomore.
Write a method `myLevel` in Java that will accepts a double representing the number of credits and returns a String containing the level.

Number of credits	Level
0 - 14.9	Lower Freshman
15 – 29.9	Upper Freshman
30 - 44.9	Lower Sophomore
45 - 59.9	Upper Sophomore
60 - 74.9	Lower Junior
75 - 89.9	Upper Junior
90 - 104.9	Lower Senior
105 or more credits	Upper Senior

OR

The table to the right below shows the maximum number of days in a month.
Write, in Java, a method `numberOfDays` which accepts an integer (month) and boolean (isLeapYear) and returns an integer representing the maximum number of days in the month. For example, if 3 and true are passed to `numberOfDays`, it will return 31; if 3 and false are passed, the method will return 31. If 2 and true are passed, it will return 29. If 2 and false are passed, it will return 28.

Month	Leap year	Maximum number of days
1	true or false	31
2	true	29
2	false	28
3	true or false	31
4	true or false	30
5	true or false	31
6	true or false	30
7	true or false	31
8	true or false	31
9	true or false	30
10	true or false	31
11	true or false	30
12	true or false	31

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5. (6) Convert the following mathematical expression into Java code (not a complete program).

$$w=\sqrt{\frac{\sqrt{\frac{x+y}{z}}-1}{(1+x)^2}}$$

6. (6) Perform the following conversions.

a. 10101001 (base 2) to base 10 Answer _____

b. 1E (base 16) to base 10 Answer _____

c. 10001101 (base 2) to base 16 Answer _____

d. 77 (base 10) to base 16 Answer _____

e. 156 (base 2) to base 10 Answer _____

f. Perform the following addition of two binary (base 2) numbers.
Your answer should be a number in binary

101 + 001 = ? Answer _____

7. (12) What does the following program print when executed?

```
public class Q7{
    public static void main(String[] args) {
                int[] v = {1,1,2,3,5,8};
                int[] w = new int[v.length];
                int n = 3, k=5;
                dump("HERE: v",v);
                System.out.println("n="+n+" k="+k);
                w=mangle(v,n);
                dump("THERE w",w);
                dump("EVERYWHERE: v",v);
                System.out.println("n="+n+" k="+k);
     }
     private static void dump(String label, int[] a) {
                System.out.print(label+": ");
                for (int i=0; i<a.length; i++){
                        System.out.print(a[i]+" ");
                }
                System.out.println();
      }

      private static int[] mangle(int[] a, int k) {
                int[] b = new int[a.length];
                k++;
                for (int i=0; i<b.length-1;i++){
                    b[i] = a[i+1];
                }
                b[b.length-1] = a[b.length-2] * 2;
                return b;
       }

    }
```

```
HERE: v: 1 1 2 3 5 8
n=3 k=5
THERE w: 1 2 3 5 8 10
EVERYWHERE: v: 1 1 2 3 5 8
n=3 k=5
```

8. (30) Write a complete Java program. You must comment the **main** program and all methods, explaining what action(s) each performs.

Design a Java class with a **main** method that reads the number of baskets scored by each player in a basketball game. The number of baskets consists of the number of two-point baskets and three-point baskets each player scored. At most there will be 25 players read in, though there could be less.

Sample Data

```
8 3
6 5
4 2
9 1
12 0
```

A sample record consists of two numbers, the first representing the number of two-point baskets and the second representing the number of three-point baskets. A record 8 3 represents 8 2-point baskets and 3 3-point baskets (for a total of 8x2+3x3 or 25 points).

main will invoke methods, that you write, to perform the following tasks:

(a) **main** will pass a filename (for input) and two integer arrays to a method **readData. It** will read from the file the number of 2-point and 3-point baskets per player and store them in two separate arrays. The method will return the total number of players read in.

For example, given the above data, after **readData** is finished executing, the arrays will contain:

2-point baskets	**8**	**6**	**4**	**9**	**12**
3-point baskets	**3**	**5**	**2**	**1**	**0**

and it will return **3**

(b) **main** will invoke a method **totalPoints** that accepts an object of a class that will enable writing to a file (such as, for example PrintWriter or PrintStream or whichever you prefer), for output, two integer arrays (number of 2-point and 3-point baskets) and the number of players read in. It will return an integer array that contains, for each player, the total number of points that player scored
Using the sample data above, the total points array will contain:

total points	**25**	**27**	**14**	**21**	**24**

(c) **main** will invoke a method **averages** that accepts an object of a class for output, 3 integer arrays (2-point baskets, 3-point baskets, total points) and the number of records read in. It will compute and print to the output file a header and the overall average number of points for 2-point baskets, the overall average number of *points* for 3-point baskets and the overall average number of total points, right adjusted. The output from the sample data would be:

```
avg2pt   avg3pt   avgpts
 15.60     6.60    22.20
```

(d) **main** will then invoke a method **sort** that is passed the array of total points and prints the number of points of the three lowest scorers, printing the lowest scorer first, then the second lowest scorer followed by the third lowest scorer. Using our sample data, the output will be:

```
3 lowest scorers
14
21
24
```

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EXTRA WORK SHEET: