

YOUR PITT EMAIL ADDRESS:

PRINT IN **BIG FIRST GRADE LEGIBLE CLEAR LETTERS**

I.E. [JFK63@PITT.EDU](mailto:JFK63@PITT.EDU) (but leave off the @pitt part)

P I T T   E M A I L → \_\_\_\_\_

YOUR FULL NAME :

PRINT IN **BIG FIRST GRADE LEGIBLE CLEAR LETTERS**

i.e JOHN F. KENNEDY

F U L L   N A M E → \_\_\_\_\_

**There are twenty (20) questions on this exam. Each question is worth 5 points.  
There is no partial credit on any question. They are all 5pts or nothing.**

**There is a bonus question #21 at the end. #21 is an essay question where you  
can write code and or comments in a paragraph form. The bonus question is  
worth 2pts all or nothing, no partial credit.**

IF ( TAKING EXAM IN SPECIAL TESTING FACILITY || YOU DO NOT HAVE A LAPTOP )

YOU MAY WRITE YOUR ANSWERS ON THE PAPER AND HAND THEM TO ME

ELSE

YOU MUST ONLINE HANDIN A FILE NAMED "Final.java" JUST LIKE FOR  
MIDTERM

**EITHER WAY YOU MUST RETURN YOUR  
PAPER EXAM TO ME OR NO CREDIT**

# THE EXAM QUESTIONS START HERE

- #1) I want to run a program Q1.java to print the sum of the numbers entered on the command line:  
– like below

```
C:\> java Q1 12 34 32 54 56 76 89
```

Here's the code for Q1.java. Select an answer below that describes the outcome.

```
1  import java.io.*;
2  import java.util.*;
3
4  public class Q1
5  {
6      public static void main(String[] args)
7      {
8          int sumOfArgs=0;
9          for ( int i=0 ; i < args.length ; ++i )
10             sumOfArgs += args[i];
11
12         System.out.print("The sum of: " );
13         for ( int i=0 ; i < args.length ; ++i )
14             System.out.print( args[i] + " ");
15         System.out.print(" = " + sumOfArgs );
16     }
17 }
```

- A Won't even compile. Will produce compilation errors from the javac command.
- B sumOfArgs value printed at end will be **wrong**
- C sumOfArgs value printed at end will be correct
- D Crashes because it does not first verify that the user entered a sufficient number of args

**#2)** If I execute a program Q2.java at the command line like this:

**C:\> java Q2**

What will be true about the args array at the moment the program starts to execute?

- A it will be null
- B it will not be null but will be of length 0
- C It will be of length 1 containing: ["C:\> java Q2"]
- D it will be of length 2 containing: ["java"]["Q2"]
- E it will be of length 3 containing: ["C:\>"]["java"]["Q2"]

**#3)** Here is a java file that compiles cleanly with no errors:

```
1  import java.io.*;
2  import java.util.*;
3
4  public class Q3
5  {
6      int x,y;
7      Q3( int x, int y)
8      {
9          this.x = x;
10         this.y = y;
11     }
12 }
```

What will happen if I execute it from the command line like this:

**C:\> java Q3**

- A it will execute but produce no output since there are no print statements
- B it will not execute
- C it will start to execute but immediately give a fatal error
- D it will execute but then hang up in an infinite loop until you hit ^C

**#4)** In java, which of the following statements is true:

- A Every executable program is a class
- B Every class is an executable program
- C Every class has a main method

#5) What is the output of the following program?

```
1  import java.io.*;
2  import java.util.*;
3
4  public class Q5
5  {
6      public static void main(String[] args)
7      {
8          int[] arr = new int[5];
9          fillArr( arr );
10         for ( int i=0 ; i<arr.length ; ++i )
11             System.out.print( arr[i] + " ");
12     }
13     static void fillArr( int []a )
14     {
15         for ( int i=0 ; i<a.length ; ++i )
16             a[i] = i*2; // 0 2 4 6 8
17     }
18 }
```

- A 0 2 4 6 8
- B 0 0 0 0 0
- C null pointer exception
- D index out of bounds exception
- E none of the above

#6) Which of the following statements is true about Q5 above?

- A line 9 is making a copy of all 5 ints in the array and handing off that chunk of ints to fillArr
- B line 9 is just handing off a copy of arr's reference to the fillArr method
- C the fillArr() call on line 9 returns and replaces itself with a reference to arr
- D none of the above

#7) What is the output of the following program?

```
1  import java.io.*;
2  import java.util.*;
3
4  public class Q7
5  {
6      public static void main(String[] args)
7      {
8          int[] arr1 = { 0,2,4,6,8 };
9          int[] arr2 = copyArr( arr1 );
10
11          for ( int i=0 ; i<arr2.length ; ++i )
12              System.out.print( arr2[i] + " ");
13      }
14      static int[] copyArr( int[] src )
15      {
16          int[] copy = src;
17          return copy;
18      }
19  }
```

- A 0 2 4 6 8
- B 0 0 0 0 0
- C null pointer exception
- D index out of bounds exception
- E none of the above

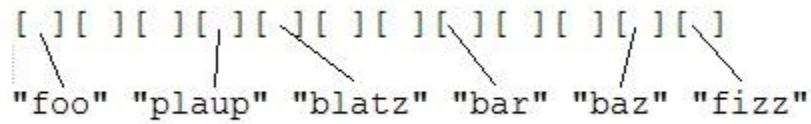
#8) Which of the following statements is true about Q7 above?

- A the copyArr() method is copying all 5 ints from the src array to the copy array
- B the copyArr() method is just returning the reference value in arr1
- C none of the above

#9) Which of the following containers most closely follows the array discipline ?

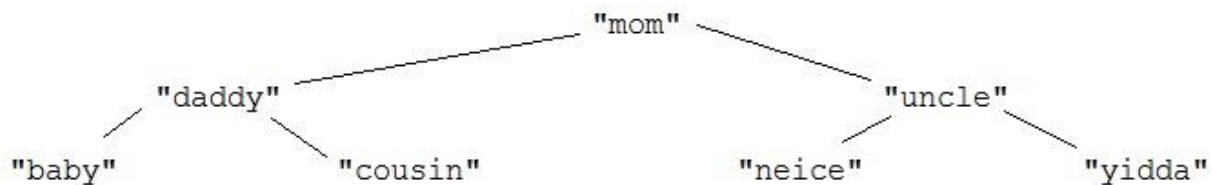
- A ArrayList
- B HashSet
- C TreeSet

**#10)** Which container does the following diagram most closely illustrate?



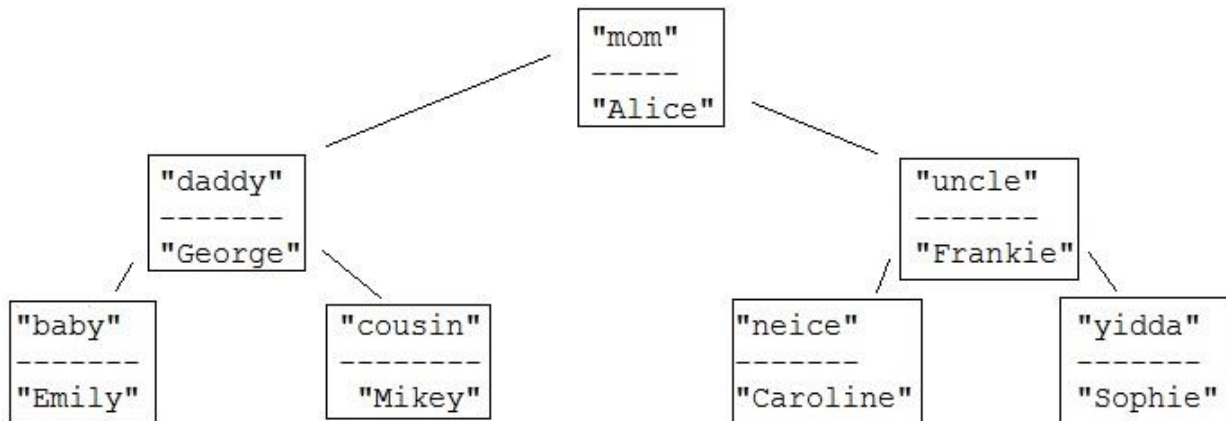
- A ArrayList
- B HashMap
- C HashSet
- D TreeSet
- E TreeMap

**#11)** Which container does the following diagram most closely illustrate?



- A ArrayList
- B HashMap
- C HashSet
- D TreeSet
- E TreeMap

#12) Which container does the following diagram most closely illustrate?



- A ArrayList
- B HashMap
- C HashSet
- D TreeSet
- E TreeMap

#13) Why is the output of the following program?

```

1  import java.io.*;
2  import java.util.*;
3
4  public class Q13
5  {
6      public static void main(String[] args)
7      {
8          String[] arr = {"i", "really", "really", "hate", "finals" };
9          // initialize a TreeSet with contents of arr
10         TreeSet<String> words = new TreeSet<String>( Arrays.asList( arr ) );
11         for( String word : words )
12             System.out.print( word + " " );
13     }
14 }
    
```

- A i really really hate finals
- B i really hate finals
- C finals hate i really
- D hate i finals really really
- E *they come out in no guaranteed order*

**#14)** Recall the Fraction class you wrote. Suppose that you were to remove the `setNumer()` and `setDenom()` methods from your class definition. What would then be true about your modified Fraction class?

- A it would be an **immutable** class
- B it would be a **final** class
- C it would be an **abstract** class
- D it would be an **interface**

**#15)** Suppose you have a very large file of Strings and you want to find out if the file contains any dupes. What would be the simplest, most efficient (fastest) container to read those Strings into, to simply determine yes/no, there is or is not, a duplicate in that file?

- A ArrayList
- B HashMap
- C HashSet
- D TreeSet
- E TreeMap

**#16)** Why is the output of the following program?

```
1  import java.io.*;
2  import java.util.*;
3
4  public class Q16
5  {   public static void main(String[] args)
6  {   {   String[] arr = {"I", "really", "really", "hate", "finals" };
7      // initialize a HashSet with contents of arr
8      HashSet<String> words = new HashSet<String>( Arrays.asList( arr ) );
9      for( String word : words )
10         System.out.print( word + " " );
11     }
12 }
```

- A i really really hate finals
- B i really hate finals
- C finals hate i really
- D hate i finals really really
- E *they come out in no guaranteed order*



**#17)** Recall the Boggle program. Which of the following statements is true?

- A in order to solve large boards faster you must use the container that lets you look up a word the fastest
- B in order to solve large boards faster you must use an algorithm that avoids forming words that will never be found in the dictionary
- C storing your dictionary in a HashMap will always produce a faster solution than storing your dictionary in a slower container such as an ArrayList
- D none of the above are true for large boards

**#18)** Recall the Jumbles program you wrote twice (once as a project then as a lab). Which of the following statements is true about that program?

- A matching a jumbles word to a dictionary word by generating all the permutations of the jumbles word is very fast but requires a vast amount of storage.
- B a HashMap is a very fast and very simple mechanism to match up a jumbles word with equivalent dictionary words
- C the amount of time it takes to Hash a very long String is greater than the amount of time it takes to generate all the permutations of a very long String

**#19)** Comparing the Boggle program and the Swamp program, which of the following statements is true?

- A if no heuristic is applied to either, the swamp solves faster than the boggle for a grid/board of the same dimensions
- B they both can be solved with a recursive depth first search algorithm
- C if both are solved using a dfs algorithm, the max depth of the call stack is the same for both programs
- D A,B and C are all true
- E none of the above are true

**#20)** Which of the following are necessary components of a recursive solution?

- A a base case
- B a reduction of the input or search space toward the base case
- C a recursive call
- D all of the above
- E none of the above

**#21)** You are asked to fill in the code for method that takes an int and returns true or false if the int is/is not a random number: `boolean isRandom( int r );` // returns **true** if r is a random

Write your response below.