

## Midterm 3 Review Worksheet

1. Write a code fragment that creates a two-dimensional ragged array of integers with 3 rows, initialized with the following data:

```
5  8  9
4 11 13 15 17
0  1
```

2. Write a code fragment which uses a nested loop to print the ragged array from #1 in the above format.

3. Draw a memory map of the ragged array from #1.

4. Write code that takes as a parameter an integer n, then creates an n-by-n two-dimensional array of ints. Fill the array with a multiplication table. For example, if n is 3, the table should be:

```
1  2  3
2  4  6
3  6  9
```

5. What is the result of the following code snippet?

```
ArrayList<Integer> list = new ArrayList<Integer>();
list.add(5);
list.add(10);
list.add(3);
list.add(19);
for(Integer num : list){
    if(num == 3){
        list.remove(num);
    }
}
```

6. List three differences between an interface and an abstract class.

7. What is method overriding and how does it differ from method overloading?

8. What is the value returned as a result of the call `recur(2)`?

```
public int recur(int n){
    if(n >= 42){
        return n/2;
    }else{
        return recur(n*n);
    }
}
```

9. Which methods are used to add and remove elements in a stack? In a queue?

10. Let  $x$  be the array [1, 2, 3, 4, 5]. If  $x$  works like a queue, what does  $x$  look like after removing one element? What if  $x$  works as a stack? In other words, a stack is “\_\_\_\_\_ in, first out” and a queue is “\_\_\_\_\_ in, first out.”

11. Write a class *Dog* which has fields name (a string) and age (an integer). Write a `compareTo` method which would allow you to sort dogs from youngest to oldest. Then write a `compareTo` method which would allow you to sort dogs in reverse alphabetical order.

12. What is the purpose of a try-catch block?

13. What is the purpose of throwing exceptions? Give an example of a case where a programmer may decide to intentionally throw an exception?

14. The following recursive code has potential to loop infinitely. Give an example input which would cause an infinite loop and circle the part of the code which can be changed very simply to fix this problem.

```
public int recur(int n){
    if(n==0){
        return n;
    } else{
        return recur(n-1);
    }
}
```

15. Implement the Euclidean algorithm, which finds the greatest common divisor of two integers,  $p$  and  $q$ . Here is the description of the algorithm: the gcd of  $x$  and 0 is  $x$ . The gcd of  $x$  and  $y$  is the same as the gcd of  $x$  and  $y$  modulo  $x$ . Implement the function in two ways, first using a while loop and second using recursion.