

## CSCI 111, Final Exam – Monday, April 30, 2012

Name \_\_\_\_\_

Question One. 15 points. Show the output that is produced when the following method is called with a value of 111 for number1 and 259 for number2.

```
public void aRecursiveMethod (int number1, int number2)  
{  
    System.out.println("Number 1 = " + number1 + ", Number 2 = " + number2);  
  
    if (number2 != 0)  
    {  
        return aRecursiveMethod (number2, number1 % number2);  
    }  
}
```

Show Output Below This Line

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Question Two. 15 points. Complete the printSquare method such that when it is called, the sides of an n by n square are printed with asterisks (\*). Feel free to use the printRow method in your solution. For example, printSquare(5) would result in this 5 by 5 square being printed:

```
*****
*   *
*   *
*   *
*****
```

```
private void printRow (int n)
{
    for (int i = 0; i < n; i++)
    {
        System.out.print("*");
    }
    System.out.println();
}
```

```
print void printSquare (int n) // n is the dimension of the square, assume it is at least 1
{
```

Question Three. 15 points. The price of three day train passes for students traveling in Italy on summer vacation is determined as follows. If a second class ticket is desired, the cost is \$150 per person. If a first class ticket is desired, it costs \$200 for one person. However, if two or more people are traveling, it costs \$175 per person. Complete the method below such that it returns the **total cost** of the tickets given the number of travelers (assume this number will be 1 or greater) and the trainClass (assume this will be 1 for first class or 2 for second class).

```
public int italianThreeDayPass (int travelers, int trainClass)  
{
```

Question Four. 15 points. Rewrite the divide method below using a try-catch statement so that if number2 happens to be 0 and an ArithmeticException is raised, the method returns the largest integer: Integer.MAX\_VALUE

```
public int divide (int number1, int number2)    // incorrect first attempt
{
    return number1 / number2;
}
```

```
public int divide (int number1, int number2)    // your solution
{
```

Question Five. 15 points. To calculate the standard deviation of a population of numbers, one must first calculate the average. Once the average is known, take the square of the difference between each number and the average, sum these numbers up, divide by how many numbers there are, and then take the square root.

For example, consider the numbers 10, 11 and 12.

The average is 11:  $(10 + 11 + 12) / 3$

Sum of the squares of the differences is 2:  $(10-11)*(10-11) + (11-11)*(11-11) + (12-11)*(12-11)$

Thus, the standard deviation is  $\sqrt{2 / 3} = 0.816$

Complete the method below so that the standard deviation is returned.

```
public double standardDeviation (double [ ] numbers) // assume the array has at least 1 item  
{
```

Question Six. 15 points. On the next page, write the Cat class such that it utilizes both the Animal interface and the Pet class. When the following main method is run, this output should be produced:

*Garfield says Meow!*

```
public static void main(String[] args)
{
    ArrayList<Animal> animals = new ArrayList<Animal>();
    animals.add(new Cat("Garfield"));

    for (Animal a : animals)
    {
        System.out.println(a.talk());
    }
}

public interface Animal
{
    public String talk();
}

class Pet
{
    private String name;

    public Pet (String inName)
    {
        name = inName;
    }

    public String getName()
    {
        return name;
    }
}
```

Place your answer to Question Six on this page.

Question Seven. 10 points. Describe briefly what each of the following statements does.

(a) `Scanner in = new Scanner (new File ("summertime.in"));`

(b) `PrintWriter out = new PrintWriter (new File ("summertime.out"));`

(c) `String token = in.next();`

(d) `out.close();`