Midterm2 Sample Problems

The following problems are similar to what you might see on an exam. NOTE: this is not the format for the exam. The format is the same as Midterm1. There will be many more problems than are shown here, these are examples.

Part 1

T / F

___ Two-dimensional arrays must have the same number of rows and columns

___ To convert a String variable myString of digits to an integer, you could call  myString.toInt()

___ To reverse a StringBuilder variable myStringBuilder, you could call  myStringBuilder.reverse()

___ The terms object and instance are often interchangeable

___ A static variable is tied to a specific instance of a class

___ If no visibility modifier is used, the default for data fields and methods is package-private

Given the following code snippet, what would the output be?

```java
public class Question {

    public static void main(String[] args) {
        int myInt = 3;
        int myIntArray[] = {0};

        modify(myInt, myIntArray);

        System.out.println(myInt);
        System.out.println(myIntArray[0]);
    }

    public static void modify(int inInt, int[] inArray){
        inInt += 4;
        inArray[0] += 4;
    }
```
Given the following code snippet, what would be the most correct way to print out the total count? Fill in the blank below

```java
public class Question {

    public static void main(String[] args) {
        Ball ball1 = new Ball();
        Ball ball2 = new Ball();

        //
        //
        //
        //
        //
    }
}

class Ball{
    private static int totalCount = 0;

    Ball(){
        totalCount++;
    }

    public static int count(){
        return totalCount;
    }
}
```

Given the following code snippet, what would the output be?

```java
public class Question {

    public static void main(String[] args) {
        Alien alien1 = new Alien();
        System.out.println(alien1.legCount);
        System.out.println(alien1.species);
    }
}
```
class Alien {
    int legCount;
    String species;

    Alien(){}
}

Given the following code snippet, what would the output for each println statement be? Write Error if the statement would produce any kind of error, and describe why the error occurred.

```
public class Question {

    public static void main(String[] args) {
        Pet myPet = new Pet("Buzz");

        System.out.println(myPet.name);
        System.out.println(myPet.isVaccinated);
        System.out.println(myPet.age);
        System.out.println(myPet.newAge);
        System.out.println(myPet.favoriteFood);
    }
}

class Pet{
    public String name;
    private boolean isVaccinated;
    int age;
    String favoriteFood;

    Pet(String name){
        this.name = name;
    }

    void setAge(int newAge){
        age = newAge;
    }
}
```
Modify the following class to make it immutable.

```java
public class Turkey {
    double weight;
    String location = "";

    Turkey(double weight, String location){
        this.weight = weight;
        this.location = location;
    }

    double getWeight(){
        return weight;
    }

    void setWeight(double weight){
        this.weight = weight;
    }
}
```

Part 2

Write the following two methods that should be usable for any two-dimensional integer array:

- fillArrayWithRandos method that takes a two-dimensional integer array and fills each position in the array with a random number between 0 and 9 inclusively. This method should also print out the array with spaces between each element (see example below)

- sumOfColumn methods that takes a two-dimensional integer array and an integer for a column and returns the sum of that column.

For example, if I declared an integer array as follows:

```java
int[][] grid = new int[size][size];
```

and then ran

```java
fillArrayWithRandos(grid);
```
the output could look like this:

```
4 7 8 1 9
5 7 9 0 2
1 1 3 4 5
3 3 1 3 4
5 1 6 3 5
```

and then running

```java
int column = 2;
System.out.println("The sum of column " + column + " is " + sumOfColumn(grid, column));
```

the output would be:

```
The sum of column is 27
```

Using the following class described in UML notation below, create a test class called TestEnemy. Within the main method of the class:

- Create an array of 50 Enemy objects giving them an x position of 250, a y position of 0, and a health of 100.
- Randomly pick 1 enemy and hit it with an amount of 37 using the appropriate method
- Then print out the health for each enemy, like so:

```
Health for enemy 0: 100
Health for enemy 1: 100
Health for enemy 2: 100
...
```

**NOTE:** Do not write the `Enemy` class! You are assuming the class is already written as outlined below. You’re only writing a test class that uses the hypothetical `Enemy` class.
### Enemy

- xPos: int  
- yPos: int  
- health: int  

+ Enemy()  
+ Enemy(xPos: int, yPos: int)  
+ Enemy(xPos: int, yPos: int, health: int)  
+ hit(): void  
+ hit(amount: int): void  
+ setX(xPos: int): void  
+ setY(yPos: int): void  
+ getX(): int  
+ getY(): int  
+ getHealth(): int

### Connecting the dots

Implement a LineSegment program by writing the following:

- 1) A LineSegment class where an object can be created by passing in the x and y coordinates of 2 points. The class should have the following methods:
  
  - A static method called LengthFromTwoPoints that returns the length of a line segment by passing in the x and y coordinates of 2 points.  
  - A method that returns the length of the line segment object

- 2) A TestLineSegment class that does the following:
  
  - Prompts a user to enter 2 points as x,y coordinates (see example below) **Note**: The user should enter everything in one line, not each number separately.  
  - Creates a LineSegment object and prints out the length of the line

```
Enter 2 points as x1,y1,x2,y2:
-1,-1,2,3
The length of the segment is 5.0
```

**Note**: The formula for finding the distance between 2 points is:
distance = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}

Coding Question: No, Mr. Bond, I expect you to dice
Write a Die (as in dice) class that has the following properties:

- a private variable of the number of sides the die has
- a no-arg constructor that will create a die with 6 sides
- a private method roll that will "roll the die", returning a number between 1 and the number of sides, inclusively
- a public method rollAgainstAnother that takes another Die object as a parameter and does the following:
  - rolls both dice
  - returns 1 if the first die’s (the one the method is called on) roll is larger than the opponents (the die that is passed in) roll
  - returns -1 if the opponent’s roll is larger
  - returns 0 if they are the same

Coding Question: Sim Satellite
You’ve just joined the newly-formed Worldwide Space Agency (WSA). Congratulations! For your first project, you’re building a satellite simulation. To start the project, you’ve been asked to do the following:

- Create a Satellite class with the following properties:
  - A variable that stores the id of the satellite. These are always integers like 1375
  - A variable that stores the distance the satellite is currently from earth, in kilometers. This should be a double value.
  - A constructor that allows you to create a Satellite instance, passing in the id and distance in kilometers.
  - A method transmit that prints out a statement saying how far the Satellite is from earth.
    - NOTE: Since this is a worldwide agency, the transmit method should take a string as a parameter that determines whether to print the distance in kilometers or miles. Only write ONE method to do this!
  - A method to convert kilometers to miles. Useful for the transmit method. 1 km = 0.621371 miles
Only write the `Satellite` class! Do **NOT** write a test class. But a sample run from a test class that creates a satellite with an id of 1476, 100 miles from earth and then transmits from that satellite in kilometers and then miles, would look like this:

```
Satellite 1476 is now 62.1371 miles from earth.
Satellite 1476 is now 100.0 kilometers from earth.
```