

CS 312 – Midterm 2 – Spring 2013

Your Name _____

Your UTEID _____

Circle your TAs Name: VICKY LUIS

Problem Number	Topic	Points Possible	Points Off
1	array trace	12	
2	conditionals	9	
3	strings	10	
4	program logic	9	
5	programming	12	
6	scanner	8	
TOTAL POINTS OFF:			
SCORE OUT OF 60:			

Instructions:

1. Please turn off your cell phones
2. There are 6 questions on this test.
3. You have 50 minutes to complete the test.
4. You may not use a calculator.
5. Please make your answers legible.
6. When code is required, write Java code.
7. You may not use arrays on questions 2, 3, 5 and 6.
8. Style is not evaluated when grading.
9. The proctors will not answer questions.

The exam is worth 60 points. Grades will be scaled to 120 for gradebook.

1. Arrays. 12 points. For each code snippet what is output when the code is run? If the snippet contains a syntax error answer "syntax error". If the snippet results in a runtime error or exception answer "runtime error".

A.

```
int x = 3;
int y = 2;
int[] data1 = new int[x * y + 2];
System.out.print(data1.length);
```

OUTPUT: _____

B.

```
double[] data2 = {0.1, 3.5, 1.5, 6.1, 0.5};
System.out.print(data2[1] + " " + data2[data2.length/2]);
```

OUTPUT: _____

C.

```
int[] data3 = new int[6];
System.out.print(data3[0] + " " + data3[3]);
```

OUTPUT: _____

D.

```
String[] names = new String[5];
System.out.print(names[0].length() + " " + names[2].length());
```

OUTPUT: _____

E.

```
int[] data4 = {5, 1, 6, 2, 3};
data4[3] += 3;
data4[2] = data4[3] * data4[1];
data4[1] = 7;
System.out.print(data4[1] + " " + data4[2] + " " + data4[3]);
```

OUTPUT: _____

E.

```
int[] data5 = new int[12];
System.out.print(data5[data5.length - 2 * data5.length]);
```

OUTPUT: _____

2. Conditionals. 9 points. If you follow the news, Cyprus, the country, is working on a plan to bailout its banks. One part of the current plan involves "taxing" (stealing?) money from citizens and corporations deposited in the bank. (Imagine if your bank announced it was simply going to tax (take) 10% of the money in your account. You go to sleep with \$1000 dollars in your account and wake up the next morning, without having spent a dime yourself, and your balance is \$900.)

In one version of the plan, deposits are taxed based on the amount in the account with different percentages.

Balances of greater than 0 and $\leq 100,000$ Euros: 5% tax

Balances greater than 100,000 Euros and $\leq 500,000$ Euros: 5,000 plus 10% tax on the amount over 100,000

Balances greater than 500,000 Euros: 45,000 plus 15% tax on the amount over 500,000

Complete a method that takes in a single parameter, an account balance in Euros expressed as a `double` and returns the tax on the account, expressed as a `double`. If the parameter is less than zero return `-1.0`.

Examples:

given a parameter equal to 50000.0 the method returns 2500.0

given 200000.0 the method returns 15000.0

given 1000000.0 the method returns 120000.0

You may not use any other classes or methods in your solution.

3. Strings. 10 points. Write a method named `newString` that accepts two parameters, a `String` and a `char`. The method returns a `String` with all instances of the `char` parameter removed and all instances of the asterisk character, `'*'`, removed. The order of other characters is the same.

Examples:

```
newString("C*S*42*9", '4') returns "CS29"  
newString("****3333", '3') returns ""  
newString("CS312", 'a') returns "CS312"
```

The only methods you may use from the `String` class are `length` and `charAt`.

```
public static String newString(String src, char tgt) {
```

4. Program Logic (9 points) Consider the following method. For each of the three points labeled by comments and each of the three assertions in the table, write whether the assertion is *always* true, *sometimes* true, or *never* true at that point in the code. Abbreviate *always* with an A, *sometimes* with an S and *never* with an N. Assume the elements in data are sorted in ascending order and that the array has at least one element.

```
// elements in data must be in ascending order. data.length > 0
public static int assertionPractice(int[] data, int tgt){
    int s = 0;
    int h = data.length - 1;
    int r = -1;
    int m = 0;
    while(r == -1 && s <= h) {
        m = (s + h) / 2;
        if(data[m] == tgt) {
            // POINT A
            r = m;
        }
        else if(data[m] < tgt)
            s = m + 1;
        else
            h = m - 1;
        // POINT B
    }
    // POINT C
    return r;
}
```

Abbreviate *always* with an A, *sometimes* with an S and *never* with an N.

	<code>r == -1</code>	<code>s > h</code>	<code>data[m] != tgt</code>
Point A			
Point B			
Point C			

5. Programming. 12 points. Write a method that simulates rolling two six-sided dice. The method accepts two parameters, a target number between 2 and 12, and a required goal, an `int` greater than 0. The method simulates rolling a pair of six sided dice until the number of times the target number has been rolled equals the goal.

For example if the target number is 7 and the goal is 3, the method "rolls" the dice until 7 has been rolled three times. The method returns the total number of times the dice were rolled to achieve the goal.

Consider this example with a target of 7 and the required number of 7's equal to 3. If the random dice rolls are

12, 5, 2, 8, 5, 7, 6, 7, 5, 5, 7

The method would return 11 because it took 11 rolls of the dice to get three 7's.

Recall how to create an object of type `Random`:

```
Random r = new Random();
```

and the method from the `Random` class, `nextInt(n)` that returns an `int` from 0 to `n - 1`.

6. Scanner. 8 Points. Write a method that accepts a `Scanner` object as a parameter. The `Scanner` is already connected to a file. The file contains **at least** one token that is an integer. There may be other, non-integer tokens in the file. The method shall return the average of the integers in the file.

For example, if the `Scanner` object was connected to the following file,

```
10    cat    20
30
50    20cat20
cat
dog   32
```

then the method would return `28.4`. ($142 / 5$).

Note your method does not handle ints that may be "embedded" in other tokens. For example, do not count the 20's in a `String` such as `"20cat20"`.

You may only use methods from the `Scanner` class. Do not use any other classes or methods in your solution.

Bonus Question 1: From the class on the Friday before spring break. Two UTCS faculty members have won the Turing Award, the "Nobel Prize" of computer science. What are their last names?
