Software Final Exam

Question 1 **10 / 10 points**

Assume you have a method in a Calculation class as follows:

```
public class Calculation(){
        public int multiplication(int a, int b){
                return a*b;
        }
}
```

Complete the blank area in the following test files. You only need to write the test method.

```
import org.junit.* ;
import static org.junit.Assert.* ;
public class CalculationTest {

    Blank

    }
}
```

```
public class CalculationTest {
    @Test
    public void testMultiplication() {

        assertEquals(40, Calculation.multiplication(4, 10));
        assertEquals(10, Calculation.multiplication(10, 1));
        assertEquals(30, Calculation.multiplication(15, 2));

    }



    }
```

The correct answer is not displayed for Written Response type questions.

Question 2 **10 / 10 points**

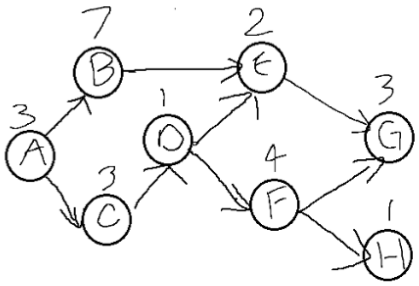
which of the following can be used to skip a test method in Junit4?

- ( ) @Test
- ( ) @Assert
- ( ) @Skip
- ✓ (•) @Ignore

Question 3 **2 / 10 points**

Consider the following network diagram,

Q1. What is the latest start tine and latest finish time for activity D? (5pts)



Q2. What is the critical path? (5pts)

Q1:

latest start time is 6
latest finish time is 7

Q2:

the Critical Path is A-C-D-H-F

The correct answer is not displayed for Written Response type questions.

Question 4 **10 / 10 points**

What is true about the basis path method?

- ○ The cyclomatic complexity is the lower bound of the number of independent paths.
- ○ It is a black box method.
- ○ It tests the performance of the system.
- ✓ ◉ It is a white box method.

Question 5 **5 / 5 points**

The estimated size of a card game is 3000 LOC. The productivity for a card game is 500 LOC/pm. Suppose the labor rate is $4000 per month, what is the total estimated project cost and the estimated effort in person-months?

- ○ $12,000 and 6pm
- ○ $15,00000 and 12pm
- ✓ ◉ $24,000 and 6pm
- ○ $20,000 and 12pm

Question 6 **5 / 5 points**

Function points are based on an estimate of the functionality of the delivered software.

- ✓ ◉ True
- ○ False

Question 7 **5 / 5 points**

A 100% statement coverage can guarantee a 100% branch coverage.

- ○ True
- ✓ ◉ False

Question 8 **5 / 20 points**

Complete the test file to test the function f that calculates the square root of a number with three test cases: 16, 4; 121, 11; 4, 2.
for example: f(16) = 4.

```
import java.util.Arrays;
import java.util.Collection;
import org.junit.Test;
import org.junit.runner.RunWith;
import org.junit.runners.Parameterized;
import org.junit.runners.Parameterized.Parameters;
@RunWith(Parameterized.class)
public class JunitTest {
        //attributes
         //constructor

          //test data generator
         @Parameters
          public static Collection<Object[]> data() {
               Object[][] data = new Object[][] {                    };
                return Arrays.asList(data);
         }
          //test method


 }
public class SquareRoot {
  public double get squareRoot(double number) {
    return Math.sqrt(number);
  }
import static org.junit.Assert.*;
import static org.junit.jupiter.api.Assertions.assertTrue;

public class JunitTest {

  @org.junit.Test
  public void test GetsquareRoot() {
    double arr1[]= {16,121,4};
    double arr2[]= {4,11,2};
    SquareRoot root=new SquareRoot();
    for(int i=0;i<3;i++) {
      assertTrue(arr2[i]==root.getsquareRoot(arr1[i]));
    }
  }

}
}
```

The correct answer is not displayed for Written Response type questions.

Question 9 **10 / 10 points**

Consider the following code, using statement coverage, which of the following test input can cover the statement "x = 2"?

```
int foo (int a, int b, int c, int d) {
   int x = 0;
   if (a > 0){
        x = 1;
   }
   else {
        if ((a == b) OR ((c == d) AND (a != d) ))
             x = 2;
         }
  return x;

}
```

- ○ a = 1, b = 2, c = 2, d = 1
- ✓ ◉ a = -3, b = -3, c = 2, d = 1
- ○ a = 1, b = 2, c = 3, d = 3
- ○ a = 2, b = 2, c = 2, d = 2

Question 10 **10 / 15 points**

Design test cases for the following programs using basis path methods.

```
public int calculation (int a, int b)
{
    1 int count = 0;
    2 if (a = = 0)
      3   while (b > 0)
          {
              4 b = b - 1;
               5  count --;
          }
     6 else  {
              7if (a > 0)
                8      while (b < 0)
                       {
                            9  b = b + 1;
                             10 count ++;
                       }
              11 else
                 12     count == b;
          }
     13return count;
}
```

The flow graph is given for the above questions:

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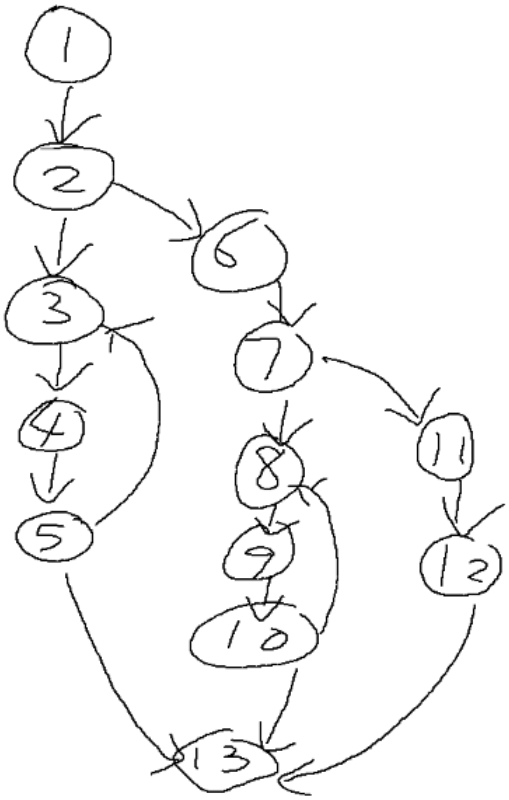

Q1: Determine cyclomatic complexity (3pts)

Q2: Determine the independent paths (6pts)

Q3: Write test cases (test inputs and expected output) to cover all your paths. (6pts)

Q1:

Nodes = 13
Edge = 16
Cyclomatic Complexity = 5

Q2: Independent Paths

1-2-6-7-8-9-10-13
1-2-6-11-12-13
1-2-3-4-5-13

Q3:

a=2,b=-2,output=2
a=0,b=2,output=-2
a=2,b=2,output=0

The correct answer is not displayed for Written Response type questions.