Vrije Universiteit, Department of Computer Science

Examination paper for **Software Testing**
28 May 2013 15:15-18:30 KC159

This is a closed book written exam.

No printed material or electronic devices are admitted for use during the exam.

The answers have to be given in English or Dutch.

Both homework and exam are compulsory and graded on a 1 to 10 scale.

The exam grade is calculated as (Q1+Q2+Q3+Q4+Q5 +10)/10.

The final grade is calculated as 0.5*homework + 0.5*exam

A pass is given if both homework and exam components are >= 5.5.

	Q1	Q2	Q3	Q4	Q5 (code)	Σ Qi	Maximum credits= (ΣQi+10)/10
a)	3		3		3		
b)	5		9		5		
c)	3				8		
d)	3				5		
e)	3				3		
f)	7						
g)	6						
Total	30	12	12	12	24	90	10

Good luck!

Q1. Concepts [30p]

a. What is a **latent fault**? Give an example [3p]
b. Define **defect density**. Why is defect density useful in testing? [5p]
c. What is a **test adequacy criterion**? Give an example. [3p]
d. What is the difference between **verification** and **validation**? [3p]
e. Why is it important to link test cases with requirements ? [3p]
f. What means **regression testing**? Enumerate a few regression testing techniques and explain in one sentence how do they work [7p]
g. Safety critical software needs a special kind of testing, regulated by standards. Enumerate a few special procedures that have to be applied when testing safety critical software. [6p]

Testing from requirements Q2-Q4 [36p]

Q2. [12p]

You have to test the validity of the birthday input in a GUI. The user has to enter his date of birth by filling 3 separate text fields : month (mm), day (dd) and year (yyyy). A year is valid if it is between 1812 and 2013.
Generate test cases you think will appropriately test this Birthday input. The output of each test case should be Valid or Invalid. Explain your strategy.

Q3. [12p]

Admission to Stateless University is made by considering a combination of high school grades (GPA) and ACT test scores. The entry requirements are:
ACT <= 36, GPA <=5, 10GPA+ACT >= 71.

a) Draw the valid input domain. [3p]
b) Generate test cases to test these requirements using 1x1 domain analysis process.[9p]

Q4. [12p]

A company has the following policy for handling orders:
"All orders of non-Star clients with bad credit should be rejected.
If there is enough product in stock then the order should be accepted, otherwise order will be put in waiting list."

Design test cases using a decision table to test this policy.

Q5. Code based testing [24p]

Given the following Java method to collapse adjacent newline characters, taken from the Apache project:

```
public static String collapseNewlines (String argStr)
          {
           char last = argStr.charAt(0);
           StringBuffer argBuf = new StringBuffer();

           for (int cldx = 0; cldx < argStr.length();cldx++)
           {
                 char ch=argStr.charAt(cldx);
                 if(ch != '\n' || last != '\n')
                 {
                       argBuf.append(ch);
                       last=ch;
                 }
           }
           return argBuf.toString();
         }
```

a) Draw the control flow graph [3p]
b) Generate a test suite that achieves 100% statement coverage. [5p]
c) Generate a test suite that is adequate with respect to the all-uses criterion [8p]
d) Generate a mutant and show a test case that will kill it. [5p]
e) Generate a mutant that will never be killed [3p]