Testing and Verification (DT085)
Solutions to Model Examination - March 2016

Important Notes. It is not allowed to use study material, computers, and calculators during the examination. The examination comprises 4 question in 2 pages. Please check beforehand whether your copy is properly printed. In order to obtain a VG you need to obtain 80/100, for a G you need to obtain 60/100. Give complete explanation and do not confine yourself to giving the final answer. The answers may be given in Swedish or English. **Good luck!**

Exercise 1 (20 points) Define the following concepts:

1. Fault, Error, Failure
2. Robust Equivalence-Class Testing
3. Regression Testing
4. Finite Feasibility

Exercise 2 (30 points) Consider the following program.

```
1: read(x);
2: read(y);
3: if x < 10 then
4:     x := 10;
5: end if
6: while y < x then
7:     y := y + 1;
8: end while
9: x := x + 1
10: write(x);
```

1. Draw the control-flow graph of the program (5 pts),
2. Calculate its cyclomatic number (10 pts),
3. Calculate all prime paths of the CFG (10 pts),
4. Define a set with the fewest number of test cases that satisfies the all-prime-path coverage criterion (10 pts).

Exercise 3 (20 points) Explain the meaning of the following formulas in English.

1. `E <> deadlock` (5 pts),
2. `A <> (a.lora.lp)andv <= 2` (5 pts),
3. `a.l --- >a.lp` (10 pts).

Exercise 4 (25 points) Calculate $Slice(9, \{x\})$ for the following program. The final solution is not sufficient; elaborate on the steps towards the final solution. (20 pts)

```
1: read(x);
2: read(y);
3: z := y;
4: while y < 10 then
5:       z := z + 1;
6: if z < y then
7:       x := 10;
8: x := x + 1
9: write(x);
```

Is the calculated slice optimal? Motivate your answer. (5 pts)