

# Software Quality Assurance (WS16/17)

## Problem Set 1

Due: in exercise, 09.11.2016

### Problem 1: Embedded Systems

- Please define the general term “system” according to Birolini and explicitly name the parts a system can encompass. Explain your answer in the view of aviation.
- What is the difference to a “technical system”?
- For the analysis of a technical (embedded) system it is crucial to extract it from its environment. How can this be achieved? Please sketch your ideas.
- Please list important non-functional requirements for embedded systems.

### Problem 2: Reliability vs. Availability

Please explain the difference between “reliability” and “availability”.

### Problem 3: Safety vs. Security

Please explain the terms “safety” and “security”. What is meant by “technical safety”? Please give examples for the safety of a failure-free system and the technical safety of a failure afflicted system.

### Problem 4: Failure, Fault

What is meant by the terms “failure” and “fault”? Please illustrate your answer by means of the “Ariane 5” disaster (see lecture).

### Problem 5: Hardware Failures vs. Software Failures

Please explain the differences between hardware failures and software failures.

### Problem 6: Correctness and Robustness

Please give your opinion on the following statements:

	true	false
Correctness has a binary character	<input type="checkbox"/>	<input type="checkbox"/>
If there are no defects, the program is correct	<input type="checkbox"/>	<input type="checkbox"/>
It can always be decided, whether an artifact is correct or not	<input type="checkbox"/>	<input type="checkbox"/>
An artifact is not consistent to its specification, if it is not correct	<input type="checkbox"/>	<input type="checkbox"/>

- |   |                          |                          |
|---|--------------------------|--------------------------|
| Robustness has a binary character                               | <input type="checkbox"/> | <input type="checkbox"/> |
| A correct system can have low robustness                        | <input type="checkbox"/> | <input type="checkbox"/> |
| Robustness is a property only of the implementation             | <input type="checkbox"/> | <input type="checkbox"/> |
| When analyzing a system, people are never taken into account.   | <input type="checkbox"/> | <input type="checkbox"/> |
| Technical safety is defined for technical systems only.         | <input type="checkbox"/> | <input type="checkbox"/> |
| A technical system cannot influence the environment and people. | <input type="checkbox"/> | <input type="checkbox"/> |
| Safety can be measured.   | <input type="checkbox"/> | <input type="checkbox"/> |

**Problem 7: Quality Model**

- a) Quality characteristics might influence each other. Think about the following dependencies and figure out, whether the influences are positive or negative.
- i. Safety – Availability
  - ii. Safety – Reliability
  - iii. Availability – Reliability
  - iv. Efficiency – Safety/Reliability