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# Advanced Distributed Algorithms and Data Structures
## WS 2016
## Homework Assignment 8

**Problem 1:**

a) Prove case 2 of the proof of Theorem 8.3.

b) A critical issue for HLCs is if the physical clock of a process is adjusted (by mistake) in forward direction since in this case the HLCs will make a jump while it will not make a jump when adjusting the physical clock in backward direction (by mistake). Is there a way of extending HLCs so that they are more robust to forward adjustments?

**Problem 2:**
Implement and test the median rule on slide 21 of Chapter 7 using a simple, sequential simulation, but this time by also implementing an adversary who can change the value of any $k$ of the $n$ nodes in each round, for some $k$ of your choice. In addition to that, each node records its last $\log n$ values and only produces an output value in a round if all of them are equal. Is it possible to get an honest node (i.e., a node that is never manipulated by the adversary) to produce two different output values over time, and how large would the $k$ have to be in your adversarial strategy for your simulation to observe that?