

ECE/CS 598NV
Special Topics (Distributed Algorithms for Wired and Wireless Networks)
Fall 2009

Homework 4

Total points: 15

Due: 11:00 a.m. on October 27, 2009

Provide explanations for your answers.

1. (5 points) Assume that, for each processor, the hardware clock satisfies the *Bounded Drift* condition (stated on page 278 of the textbook). Consider a two processor system in which all message delays are identical and constant, but the delay itself is not known to the processors *a priori*. What is the optimal skew ϵ that may be achieved in this case, while also satisfying the clock validity condition (for any γ)? Assume that the processors do not fail.
2. (5 points) Assume that for each processor i , $HC_i(t) = t + c_i$ where c_i is constant. Consider a network of 3 nodes A, B, and C, such that bidirectional links AB and BC exist, but link AC does not exist. Message delays on each link are in the range $[d - u, d]$. Determine the least skew achievable in this network. Assume that the processors do not fail.
3. (5 points) Consider the system-level diagnosis problem. Suppose that in a given system some of the nodes are known to be always fault-free. Let N denote the set of such nodes.

Determine the necessary and sufficient conditions for a test graph to be t -diagnosable, similar in form to the conditions stated in *Theorem [Kohda][21]* on page 10 in the required reading paper *System Level Diagnosis: A Review*.