

Spring Semester, 2007

PROBLEM #1

Due Date: Thursday, February 22

**Theorem 1** *Given a set of  $n$  processors that are at distance  $d$  from each other, the worst case clock skew is  $\Omega(d(1 - 1/n))$ .*

**Proof:** Let  $A$  be a CS algorithm. Let  $\alpha$  be an execution of  $A$  in which the delay of all messages from  $p_i$  to  $p_j$  is 0, if  $i < j$  and  $d$ , if  $i > j$ . Let algorithm  $A$  have skew  $\epsilon$ .

**This proof is completed using the following lemma. Prove the lemma and then complete the proof.**

**Lemma 2** *For any  $k$ ,  $1 \leq k \leq n - 1$ ,  $L_{k-1}(t) \leq L_k(t) - d + \epsilon$ .*

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