ECE 526 (Spring 2013) Distributed Algorithms
Homework 5   Due: 9:30 a.m., April 30, 2013 (Monday)

Please type your answers (e.g., using Latex, or Word).

See the policy of 48-hour extension described in the course handout.

1. This question relates to Ben-Or's randomized algorithm in the paper by Aguilera and Toueg.

   (a) In line 12, the algorithm chooses 0 or 1 randomly with probability 1/2 each. How will the algorithm behavior change if 0 is chosen with probability 1/3 and 1 with probability 2/3 ?

   (b) Will the algorithm specified in the above paper remain correct if up to f nodes can be Byzantine faulty? Explain why.

2. This questions relates to the paper by Herlihy and Shavit.

   Consider the consensus problem with 2 processes. The decision value must be 0 if both processes have input 0, and the decision value must be 1 if both processes have input 1.

   (a) Assuming that the inputs at the two processes are binary, and always identical, draw the input complex and output complex for this problem.

   (b) Is the exact consensus problem solvable under the assumption in part (a) in an asynchronous system with up to 1 crash failure. If you answer no, explain why. If you answer yes, sketch an algorithm.

3. This question relates to system diagnosis. Consider nodes named 0 through 20, such that node i can test nodes $i+1$, $i-1$, $i+2$ and $i-2$ (all computations are modulo 21). Determine the largest t such that this system is t-diagnosable under the PMC model.