CS5320 Theory Assignment - 3

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Question 1

Early-stopping algorithm for Consensus under Crash Failures

Modify the Consensus Algorithm for Crash Failures (synchronous system) to terminate within $f + 1$ rounds when the actual number of stop-failures (f_a) is lower the f.

The Algorithm gives a consensus algorithm for n processes, where up to f processes, where $f < n$, may fail in the fail-stop model. Here, the consensus variable x is integer-valued. Each process has an initial value x_i.

If up to f failures are to be tolerated, then the algorithm has f + 1 rounds.

Modify this algorithm to include an early stopping mechanism where the algorithm terminated when the actual number of stop failures f_a is less then f.

Question 2

Generalizing the Consensus Problem with binary inputs to work with multi-valued inputs

Assume that you have a solution to the Consensus Problem problem that works with binary inputs.

Can you use this to solve the Consensus Problem to work with multi-valued inputs.