Dr. Christian Scheideler
Johns Hopkins University

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Theory of Network Communication

Fall 2002

Assignment 8

Problem 19 (4 points)**:**
Show that there is a caching strategy for the hypercube that is $O(\log n)$ competitive. (Hints: Use a proof similar to the one for the mesh. Recall the oblivious routing strategy we used for the hypercube and the fact that a d-dimensional hypercube contains two $d-1$-dimensional hypercubes.)

Problem 20 (4 points)**:**
Consider the following strategy: Given a constant-degree network $G = (V, E)$ with n nodes and flow number F, simply take a complete binary tree $T(G)$ with the nodes of G as leaves for each object and map each node of $T(G)$ randomly to a node in G. Show that in this case the competitive ratio of the caching strategy is $O(F \log n)$.