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Theory of Network Communication

Fall 2003

Assignment 4

Problem 8 (2 points)**:**
Show that the b-ary DeBruijn graph of dimension d has a degree of $2b$ and a diameter d. Express d in terms of n (the number of nodes) and b in order to show that the DeBruijn graph can be used to prove Theorem 5.8.

Problem 9 (2 points)**:**
Compute the edge expansion of an $n \times n$-torus. It is sufficient here to guess the right set U and to compute the value $c(U, \bar{U}) / \min\{c(U), c(\bar{U})\}$.

Problem 10 (6 points)**:**

(a) Write a C++ program in the Spheres environment that can generate a 2-dimensional $n \times n$-grid of arbitrary side length n so that the Sync mechanism can be run on it. Only use 4 node pointers in every node object for this. (3 points)

(b) Write a C++ program in the Spheres environment that can generate an arbitrary d-dimensional hypercube so that the Sync mechanism can be run on it. Only use d node pointers in every node object for this. (3 points)