MATH 3330 — Applied Graph Theory

Assignment 6

Due Tuesday, February 27, 2007 (before class)

1. Either draw the graph or explain why none exists:

   (a) A connected graph with 11 vertices and 10 edges and no cut-vertices.

   (b) A 3-connected graph with exactly one bridge.

   (c) A graph for which $\kappa_v(G) = \kappa_e(G) < \delta_{min}(G)$.

2. An network engineer wants to build a network that is k-connected (for some positive integer k). She proposes the following algorithm: Start with a complete graph K_{k+1}. At each next step, add a vertex to the existing graph, and add edges from this new vertex to k existing vertices. Continue until the desired number of vertices is reached.

   Does this algorithm always produce a k-connected graph? If not, give a counterexample. If so, give an argument why.

3. Consider the circulant graphs, defined in section 1.2 of the text. Give some general conditions on n, $s_1, s_2, \ldots$ for which the graph $circ(n; s_1, s_2, \ldots)$ is bipartite. Explain your answer.

4. Problem 6.2..2. Draw the $(2, 3)$-deBruijn digraph and use it to construct two different $(2, 3)$-deBruijn sequences.

5. Problem 6.2.23. Find the RNA chain that matches the given fragments.