

AMSC/CMSC 660      Quiz 3      ,      Fall 2004

Show all work. You may leave arithmetic expressions in any form that a calculator could evaluate. By putting your name on this paper, you agree to abide by the university's code of academic integrity in completing the quiz. Use no books, calculators, cellphones, other electronic devices, communication with others, scratchpaper, etc.

Name \_\_\_\_\_

1a. (5) Recall the Kenyon, Randall, and Sinclair (KRS) algorithm for counting the number of arrangements of  $k$  dimers on a given lattice. At each iteration, either nothing happens or a dimer is added, deleted, or moved. If it has been long enough since our last recording, then the resulting configuration is added to the record. Why don't we record every configuration?

1b. (5) Describe what happens in 1 iteration of a Metropolis algorithm for the Traveling Salesperson Problem (TSP) after a pair of cities is chosen at random.

2a. (2) If  $y$  is an  $n \times 1$  vector and  $Q$  is an  $n \times n$  real orthogonal matrix, prove that  $\|Qy\|_2 = \|y\|_2$ .

2b. (8) Let  $A$  be an  $m \times n$  matrix. Write a column-oriented Matlab algorithm for computing

$$s_i = \sum_{j=1}^n |a_{ij}|$$

for  $i = 1, 2, \dots, m$ .