

CSE 484 Midterm I Exam

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I. QUESTION

A queen stands on the upper left square of a 8×10 chessboard. Two players make turns moving the queen either any number of squares to the right or any number of squares downward or any number of squares along a diagonal in the southeast direction. The player who can place the queen on the lower right square of the chessboard wins. Who will win? Describe the winning strategy.

II. QUESTION

What is the optimal global alignment for APPLE and HAPPE? Show all optimal alignments and the corresponding paths under the match premium +1, mismatch penalty -1, and indel penalty -1.

III. QUESTION

Consider partial digest $L = \{1, 1, 2, 2, 3, 3, 5, 6, 7, 8, 9, 9, 10, 11, 12, 14, 15, 21, 23, 24, 26\}$. Solve the Partial Digest problem for L (i.e., find X such that $\Delta X = L$).

IV. QUESTION

The search trees in the text are complete k -ary trees: each vertex that is not a leaf has exactly k children. It is also balanced: the number of edges in the path from the root to any leaf is the same (this is sometimes referred to as the height of the tree). Find a closed-form expression for the total number of vertices in a complete and balanced k -ary tree of height L .

V. QUESTION

How many permutations on n elements have a single breakpoint?

VI. QUESTION

Write an iterative algorithm that iterate over every index from $(0, 0, \dots, 0)$ to (n_1, n_2, \dots, n_d) .