

## 6.851 ADVANCED DATA STRUCTURES (SPRING'10)

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Problem 1      *Due: Thursday, Feb. 11*

Be sure to read the instructions on the assignments section of the class web page.

**Transposing a matrix.** Prove that there is a binary search tree supporting the access sequence  $0, k, 2k, \dots, k^2 - k, 1, k + 1, 2k + 1, \dots, k^2 - k + 1, \dots, k - 1, 2k - 1, 3k - 1, \dots, k^2 - 1$  in constant amortized time per operation. (This access sequence is equivalent to accessing a  $k \times k$  matrix of entries, in column-major order, when the items are stored in row-major order.)

**Logarithmic redux.** Give a purely geometric argument that there is a binary search tree supporting any  $m$  searches on  $n$  items in  $O(m \log n)$  total time. (Reason about point sets, not binary search trees.)

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