CSE 326 Summer 2006
Assignment 2
Due: Wednesday, July 5

For all algorithm and data structure design problems, please provide elegant pseudocode
and an adequate explanation of your methods. It is often helpful to include small examples
demonstrating the method. Put your name at the top of each sheet of paper that you turn in.

1. Weiss, 2.7 (part a only)
2. Weiss, 6.18 (parts a, b, c, d)
3. Weiss, 6.32
4. An \( m \times n \) Young tableau is an \( m \) by \( n \) matrix such that the entries of each row are in
sorted order from left to right and the entries of each column are in sorted order from
top to bottom. Some of the entries of a Young tableau may be \( \infty \), which we treat
as nonexistent elements. Thus, a Young tableau can be used to hold \( r \leq mn \) finite
numbers.

(a) Draw a \( 4 \times 4 \) Young tableau containing the elements \{9, 16, 3, 2, 4, 8, 5, 14, 12\}.
(b) Argue that an \( m \times n \) Young tableau \( Y \) is empty if \( Y[1, 1] = \infty \). Argue that \( Y \)
is full (contains \( mn \) elements) if \( Y[m, n] < \infty \).
(c) Give an algorithm to implement deleteMin on a nonempty \( m \times n \) Young tableau
that runs in \( O(m + n) \) time. Your algorithm should use a recursive subroutine
that solves an \( m \times n \) problem by recursively solving either an \( (m - 1) \times n \)
subproblem or an \( m \times (n - 1) \) subproblem. (Hint: think about a recursive
version of deleteMin). Prove your time bound.
(d) Show how to insert a new element into a nonfull \( m \times n \) Young tableau in \( O(m + n) \) time.
(e) Give an \( O(m+n) \)-time algorithm to determine whether a given number is stored
in a given \( m \times n \) Young tableau.