Algorithms: Assignment 6

Due date: October 2 (Wednesday)

Problem 1 (5 points)
Let $A[1..n]$ be a *sorted* array of n distinct integer numbers. Write an efficient algorithm Index-Search(A, n) that finds an index i such that $A[i] = i$. If the array does not have such an element, the algorithm should return 0.

Problem 2 (5 points)
A *d-ary heap* is like a binary heap, but instead of 2 children, nodes have d children.

(a) How would you represent a d-ary heap with n elements in an array? What are the expressions for determining the parent of a given element, Parent(i), and a j-th child of a given element, Child(i, j), where $1 \leq j \leq d$?

(b) Write an efficient implementation of Heapify and Heap-Insert for a d-ary heap, and give the running time of your algorithms in terms of n and d.