

CSE 332 Summer 18

Exercise 01

d -rithmetic

Due Date: Friday June 29, 11:59 PM
Submit your answers as a pdf to gradescope.

For each of the following questions, give an **exact** formula in terms of the relevant variables. Note that when giving a formula you may need to, e.g., take ceilings or floors to get it exactly correct.

1. Consider a 3-heap (i.e. a heap where each node has at most 3 children) stored as an array, with the root node at index 0. What are the indices of the parent and n^{th} child of the element at index k ? [8 points]
 - $\text{parent}(k)$
 - $\text{child-0}(k)$
 - $\text{child-1}(k)$
 - $\text{child-2}(k)$
2. Generalize your answer from part 1: If a d -heap (i.e. a heap where each node has at most d children) is stored as an array (with the root at index 0), give the formula for the index of the parent of index k and the index of the n^{th} child of index k (where $0 \leq n < d$): [6 points]
 - $\text{parent}(d, k)$
 - $\text{child}(d, n, k)$
3. If a d -heap has height h what is the maximum and minimum number of nodes it can contain? [4 points]
 - $\text{maxNodes}(d, h)$
 - $\text{minNodes}(d, h)$
4. If a d -heap has n nodes, what will its height be? [2 points]