You will submit your solution to this assignment to the Curator System (as `HW3`). Your solution must be either a plain text file (e.g., NotePad) or a MS Word document; submissions in other formats will not be graded.

Partial credit will only be given if you show relevant work.

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1. Consider the storage capacity of a B-tree.

   a) [20 points] What is the maximum number of data values a B-tree of order 10 can hold if its height is 4?

   b) [20 points] Derive a function of m and h that expresses the maximum number of data values a B-tree of order m can hold if its height is h.

2. Suppose you have a B-tree of order m and height h.

   a) [10 points] In the worst case, what is the average-case Θ-complexity of the splitting operation that may be necessary when an insertion is performed. Explain why.

   b) [10 points] Assuming no merging occurs, what is the maximum number of times the disk must be accessed (reads and/or writes) when a deletion operation is performed? Explain why.

   c) [10 points] Repeat part b assuming that merges may be necessary.

3. Suppose you have a B-tree of order 101.

   a) [10 points] What is the minimum number of values the tree could store if the tree has two levels? Explain.

   b) [10 points] What is the minimum number of values the tree could store if the tree has three levels? Explain.

   c) [10 points] What is the maximum number of values the tree could store if the tree has two levels? Explain.