

Data Structures
Prof. Bolton
Assignment

Name: _____
Net ID: _____

This assignment contains 1 pages (including this cover page) and 3 questions. Total of points is 100.

Conditions: All work must be completed individually. No outside resources are permitted. The only permitted resources are your texts and class notes.

Write your answers neatly and clearly on standard paper. Include your name and Net ID. Follow submission instructions as indicated on Canvas.

1. (70 points) Answers questions from Drozdek CH 7.5: 1, 2, 3, 4, 5, 8.
2. (15 points) Consider your B-tree project implementation. When performing an insertion or removal the structural constraints must be considered. As a result, a node may be split or nodes may be merged to enforce these constraints. In many instances a merge is avoided unless absolutely necessary. For example, if there exists an adjacent sibling with more than the minimum number of keys, then a key is “stolen” from the sibling via the parent so as to avoid a merge. In class we viewed an example where the adjacent sibling is checked (to avoid a merge). In general, can a key be stolen from a non-adjacent sibling? If so, what overhead might this steal incur in order to maintain order and structural constraints?
3. (15 points) Note that a B-tree is an m-ary tree. Discuss how the increase of m affects the time complexity associated with searching an m-ary tree. Theoretically speaking (in terms of step counts or bounding notation), what is the optimal value of m; justify your response. Follow up your discussion explaining why B-trees are an efficient solution in some cases.