MTH 4320 Homework 8

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Problem 1

Problem 2

Solution. We can start at the parent of the last leaf in the max-heap. For every parent in the level we run a modified heapify for a min-heap so we swap the parent with the smallest children. We repeat this algorithm until we reach the root. Since the max-heap is ordered from greatest to least so after we run the algorithm then every parent of the new min-heap will be smaller than or equal to its children. The running time of building a heap is $O(n)$. There is no asymptotically faster algorithm because we have to visit all n nodes of the heap. Therefore, the time complexity of the algorithm is $O(n)$. ■

Problem 3