

Algorithms

CMPT 435

– Assignment 2 - 100 points

Goals	<ul style="list-style-type: none">to implement sorting, searching, and hashing, and to understand their performance.
Requirements and Notes	<ul style="list-style-type: none">Download the the text file <code>magicitems.txt</code> from our web site.Read it line by line into an array.Develop your own implementation of selection sort, insertion sort, merge sort, and quick sort. [40 points]Sort using your selection sort. Print the number of swaps.Sort using your insertion sort. Print the number of swaps.Sort using your merge sort. Print the number of swaps.Sort using your quick sort. Print the number of swaps.Record your results in a LaTeX document and include the asymptotic running time of each sort and explain why it is that way.Develop your own implementation of linear and binary search. [40 points]Randomly select 42 items.Perform a linear search on the sorted array for each of those randomly selected items. Print the number of comparisons for each search and compute the overall average.Perform a binary search on the sorted array for the same randomly selected items. Print the number of comparisons for each search and compute the overall average.Add your results to the LaTeX document, including the asymptotic running time of each search and why it is that way.Develop your own implementation of a hash table with chaining. [20 points]Load the hash table with the items either from the file or from your array.Retrieve the same 42 randomly selected items as before from the hash table. Print the number of “search” (get/lookup) calls for each and compute the overall average.Add your results to the LaTeX document, including the asymptotic running time of hashing with chaining and why it is that way. <p>As usual, your code must separate structure from presentation, be professionally formatted yet uniquely yours (show some personality), use and demonstrate best practices, and make me proud to be your teacher. [−∞ if not]</p>
Resources	<ul style="list-style-type: none">Insertion sort, merge sort, and quick sort are described in our text in sections 2.1, 2.3, and 7.1 respectively.Linear and binary search are described in our text in sections 10.2 and 27.3 respectively.Hash tables with chaining are described in our text in section 11.2.
Submitting Your Work	<p>Make many commits to GitHub. Be sure that you make your final commit for this assignment on or before the due date. (See our syllabus for those details.)</p>