

## Homework #8 - Sorting

Implement 3+ sorting algorithms of your choice!

In Swift, they should be implemented as an extension to Array (I'll post a video explaining this).

Calculate the average time taken to sort an Array of 1000 randomly sorted Integers, as well as the time taken to sort an Array of 1000 numbers already in order, and 1000 numbers in reverse order.

Fill out the following chart:

Algorithm	Presorted	Random (avg of 100 runs)	Reverse order
Heap Sort	0.0614	0.2 secs (comp super slow)	0.0565
Insertion Sort	0.0041	2.293 secs	3.435
Selection Sort	1.9249 ??	2.1065	1.991
Bubble Sort	0.0112	7.785???	11.304 ????

If you're feeling ambitious, count how many times in each algorithm makes a comparison between numbers in the array, and how many times a number is copied somewhere (swapped/into a temp variable).

Algorithm	Presorted		Random (avg of 100 runs)		Reverse order	
	# of comparisons	# of moves	# of comparisons	# of moves	# of comparisons	# of moves

## Written

1) Which of the following tasks would be faster on sorted data

- a. Finding the smallest element      Fastest
  - b. Calculating the average of a set of values      4th
  - c. Finding the median value      2nd fastest
  - d. Checking for the existence of a particular element      3rd
  - e. Finding the most common element      5th
- So a, c, d, b, e!

2) What sorting algorithm may be best for the following situations

- a. You have 100 computers to split up the sorting on      Merge Sort.
- b. You have a set of small integers, unique 1-1000      Radix Sort?
- c. You have a set of floats/doubles from 1-1000      Radix/Heap?
- d. You have a nearly sorted list      Insertion Sort!

3) Which of the algorithms would be easily adaptable to a doubly linked list?      MERGE SORT

4) Come up with an example of a 10 element array that is the best case scenario for a bubble sort, and one that's a worst case scenario for a bubble sort.

Best case: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9]

Worst case: reversal of best case