1 Comparison of Sorting Algorithms

1.1 Temporal and Spatial Locality

Temporal

Temporal locality is dependent on how many variables you have and often you have to replace them.

```
sum ← 0
j ← 1
for i = 1 to 10 do
    sum ← sum + j
    j ← j + j
end for
```

The above program has good temporal locality if there are three registers, but bad temporal locality if there are only two registers (there are three unique variables in the program above so anything with less than three avaliable registers will have bad temporal locality).

Spatial

If a particular storage location is referenced at a particular time, then it is likely that nearby memory locations will be referenced in the near future. In this case it is common to attempt to guess the size and shape of the area around the current reference for what it is worthwhile to prepare faster access for subsequent reference.

1.2 Comparison Table

Algorithm	Worst Comp.	Avg. Comp.	Worst Moves	Avg. Moves	Worst Exch.	Avg. Exch.	In Place	Spatial Locality
Bubble Sort	$n^2/2$	$n^2/2$			$n^2/2$	$n^2/2$	Yes	Yes
Insertion Sort	$n^2/2$	$n^2/4$	$n^2/2$	$n^2/4$			Yes	Yes
Selection Sort	$n^2/2$	$n^2/2$			n	n	Yes	Yes
Mergesort	$n \lg n$	$n \lg n$	?	?			Y/N	Yes
Heapsort	$"n \lg n"$	$n \lg n$	$"n \lg n"$	$n \lg n$			Yes	No
Quicksort	$n^2/2$	$1.4n \lg n$	?	?			Yes	Yes