Assignment 8

1 d)

The sieve algorithm has a high time complexity due to the fact it has several loops within each other. This means that the time taken to perform it increases drastically as ***n*** increases. Therefore, for large ***n*** data the algorithm could take such a long time it becomes unfeasible. It already takes almost a second for n=10000 so for huge data sets it might be too slow to be useful to the programmer.

2 d)

The search algorithm performs the mergesort algorithm which has a time complexity of $O(n\log_2(n))$ and then goes on to perform a binary search which is $O(\log_2(n))$. *The* entire algorithm therefore has $O(n\log_2(n))$ time complexity.

3 a)

Structured data abstraction is the process of representing how the data type is organised in order to understand how to manipulate and interact with it and omitting technical details. The omitted details are those relating to the implementation of the data type that are largely unnecessary for programmers wanting to use it.

3 b)

Control abstraction is the representation of the processes being performed by a programming language in an intuitive and simplified way. Therefore, the programmer can understand how to interact with the language in order to achieve the desired result without concerning themselves with all of the technical operations taking place.

This is an important concept in programming as the quantity and complexity of operations that are occurring within a machine even for the simplest tasks would be extremely time-consuming and wouldn't add much in terms of understanding how to interact with the programming language. We still need however to understand certain things to effectively operate the language so abstraction provides us with this understanding without wasting time understanding concepts that are irrelevant for operation.