CSC108H Worksheet: Selection Sort Analysis

1. In the list below, $i$ passes of the selection sort algorithm have been completed, and the double bar separates the sorted part of the list from the unsorted part.

\[
\begin{array}{c|c|c}
\text{L} & \text{sorted} & \text{unsorted} \\
\end{array}
\]

(a) `get_index_of_smallest(L, i)` works by comparing pairs of items from the unsorted section. If there are $n$ items in $L$, when `get_index_of_smallest(L, i)` is executed, how many pairs of items are compared? (Your answer should be a function involving $n$ and $i$.)

(b) For function `get_index_of_smallest(L, i)`, is there a worst case and a best case number of comparisons?

(c) In terms of the number of items in the unsorted section, does `get_index_of_smallest` have constant running time, linear running time, quadratic running time, or some other running time?

   (a) constant   (b) linear   (c) quadratic   (d) something else

(d) In function `selection_sort`, the first time that function `get_index_of_smallest` is called, $i$ is 0; the second time, $i$ is 1; and so on. What value does $i$ have the last time that function `get_index_of_smallest` is called?

(e) For the call `selection_sort(L)`, write a formula expressing how many comparisons are made during all the calls to `get_index_of_smallest`.

(f) In terms of the length of the list, does `selection_sort` have constant running time, linear running time, quadratic running time, or some other running time?

   (a) constant   (b) linear   (c) quadratic   (d) something else