

1)

(i) number of comparisons

The first pass compares every element with its adjacent, so $(n-1)$.

The second pass now has one less pair to compare, so $(n-2)$, and so on.

This is the sum of the first n natural numbers, therefore the number of comparisons can be calculated by the formula $n(n-1)/2$

(ii) average-case number of swaps for bubble sort

To get the average number of swaps, divide by two, therefore the formula is $n(n-1)/4$

4)

These results match my complexity analysis perfectly. When plotting the graph, it is exponential, and the comparisons and swaps are both orders of n^2 , quadratic growth, therefore, the results are exactly as expected.