## Time Complexity for Insertion Sort

* The ith iteration may have 1,2...i key comparisons, each with 1/i chance.
* Average number of comparisons in the ith iteration:
* Hence, total complexity:

|  |
| --- |
| Since there are sub-arrays, the total time complexity is  ( |

## Time Complexity for Merge Sort

### Merge Function:

* Best case, e.g. when list is already sorted allowing first sublist to traverse till end, is Θ(n/2)
* Worst case, e.g. when list is sorted the wrong way, is Θ(n-1)

### Main Function (worst case):

= …

Let . W(S) = 0. Hence,

Sub and

### Main Function (best case):

= …

Let . W(S) = 0. Hence,

Sub

|  |
| --- |
| Either way, time complexity is |

## Time Complexity Overall