Implement the following four (in java):

- Sort an array of numbers using insertion sort
- Sort an array of numbers using merge sort
- Count the total number of inversions in quadratic running time
- Count the total number of inversions in log-linear running time

You can use the stub from the previous lab (or write your fres code)
There are two test case folder

- Test_cases_for_inversion
- Test_cases_for_sorting

Submit the following:

- Correct working code **40 point**
- A report that shows the following:
    - Screenshot of working implementation of your code (one screen shot of each of the four algorithms) **20 points**
    - A graph that plots the actual running time (in MS or seconds) for insertion sort and merge sort (for the given test cases). The x-axis is the total number of elements sorted and the y axis should be time in seconds. (you can use excel or any other tool to plot this graph) **15 points**
    - A graph that plots the actual running time (in MS or seconds) for counting the total number of inversions of both your implementation (a) taking quadratic running time and (b) taking log-linear running time. The x-axis is the total number of elements sorted and the y axis should be time in seconds. (you can use excel or any other tool to plot this graph) **15 points**
    - A list of actual numbers of inversions deducted for all files **5 points**
- Perform the running time analysis of mergesort using (a) master theorem (b) substitution method (3) recursion tree method **15 points**