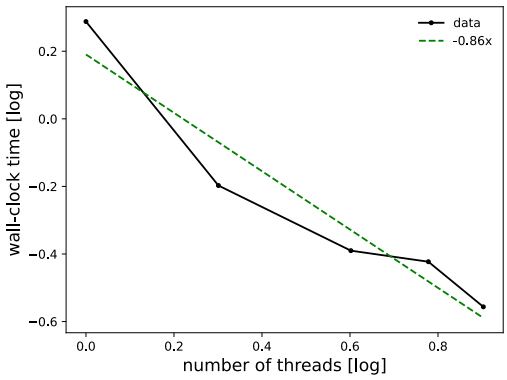
HW05 Report by CHEN, Ning (40841230S)

Q1. Convert the 2D SOR Poisson solver in the previous HW to C or Fortran and parallelize it with OpenMP

(1) Take advantage of the odd-even ordering

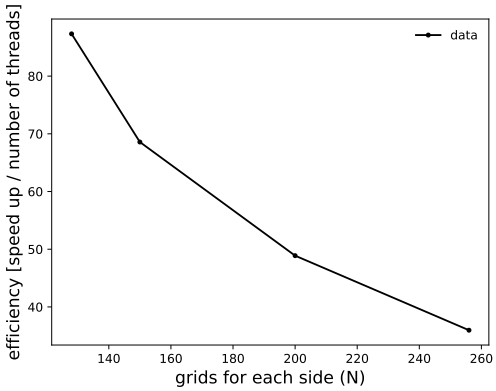
Ans. Because all odd/even cells can be updated at once using the old values of the even/odd cells in the SOR method. It is possible to divide the iteration into two steps: first update the odd cells and then update the even cells. This strategy can help with parallelization.

(2) How does performance scale with the number of threads?



Ans. In this figure, we can see that the wall-clock time decreases as the number of threads increases. Finally, we can find that they have a linear relationship under the log scale. The result seems reasonable.

(3) How does parallel efficiency, defined as "speed-up / number_of_threads" ,change when increasing the 2D array size?



Ans. In this figure, we can see that the parallel efficiency decreases as the number of grids increases. From the result seems that the code didn't parallelization well. In my expectation, the parallel efficiency should increase but it doesn't. Maybe there are some points I don't consider when implementing parallelism.