



To test the robustness of this algorithm, the algorithm should be tested with large input of  $N$ . Considering limited computational power my computer has. The matrix size of  $N$  is defined of maximum size of 1000. Since  $A$  is randomly generated in this experiment. I give each size of matrix 50 trials to mitigate the random error.

As the figure one shows on the left, both of the algorithm has absolute error increase as the matrix size gets larger. But QR method has better accuracy compare then GE when  $N$  gets large. As indicated from the graph, the overall error of GE method is above of QR method. This shows that QR method is more robust compare then GE method in solving the  $N \times N$  linear system.

As figure two shows on the right, the computation time QR grows slower than GE as  $N$  gets large. Which means QR method has better efficiency compare than GE method in solving the  $N \times N$  linear system. But one thing worth mention is that the QR decomposition time does not included here. After taking QR decomposition into account and run an experiment on that, I find that QR method actually takes slightly more computational time than GE method. In conclusion, the overall efficiency of QR method is not better than GE method.