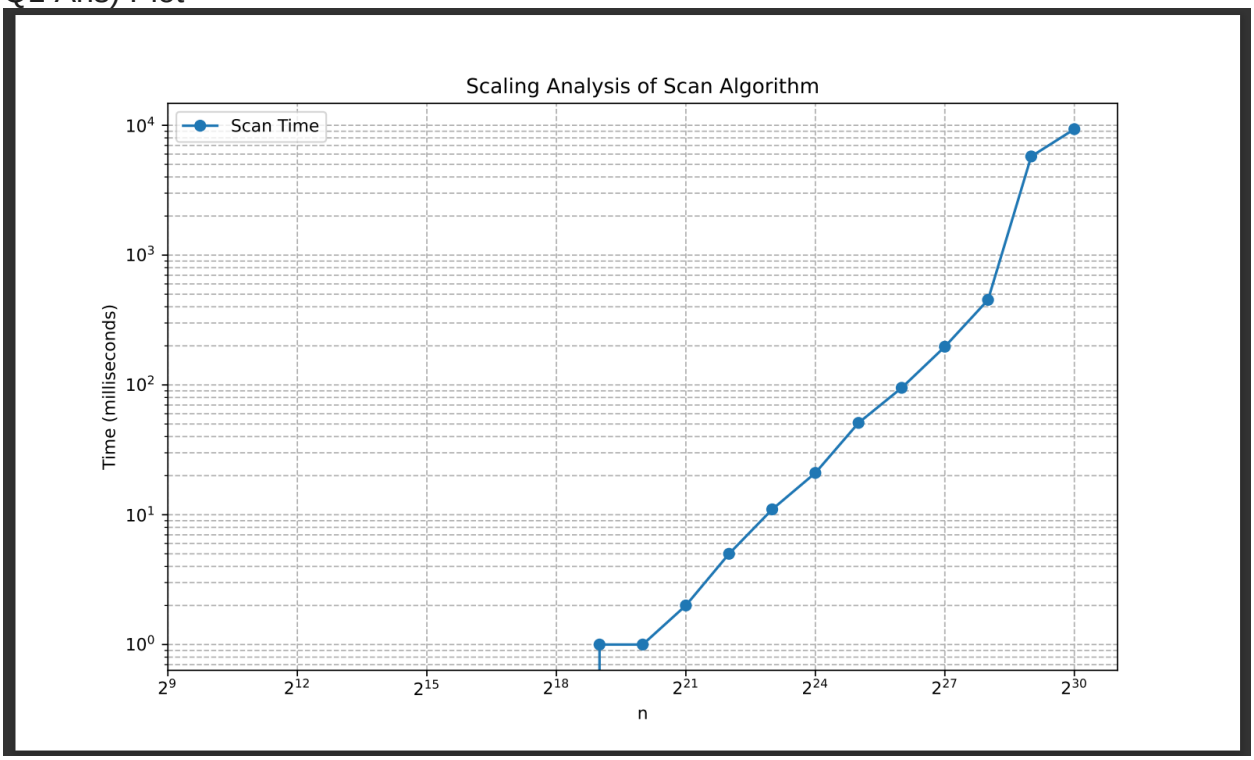
Q1 Ans) Plot



Q3 Ans) mmul1, mmul2, and mmul3 perform differently on an Euler compute node because of how they access memory. mmul1 uses row-major order, which aligns with how memory is stored, making access efficient. mmul2 and mmul3, on the other hand, use column-major order, which forces the CPU to switch between memory locations, reducing efficiency. The slight difference in loop order between mmul1 and mmul2 results in a minor time difference, while the more significant loop reordering in mmul3 leads to a more noticeable discrepancy.

mmul1 and mmul4 both use row-major access, but with different data structures: 1D arrays and std::vector, respectively. This structural difference, however, has a negligible impact on performance because both 1D arrays and std::vector objects are typically stored in contiguous blocks of memory.