

Problem 1: Let A be a 2×2 matrix such that $\det(A) = 6$ and

$$\text{adj}(A) = \begin{pmatrix} 1 & 2 \\ 4 & 6 \end{pmatrix}$$

Compute A^{-1}

Problem 2: Using Gaussian elimination, it takes approximately $n^3/3$ operations to solve the problem $Ax = b$, where A is an $n \times n$ matrix. A modern CPU (for example, an overclocked AMD FX 6300) can perform an operation approximately once every 0.25 nanoseconds (1 nanosecond is 10^{-9} seconds).

Approximately how long will it take a modern computer to solve this problem, given...

- a) a 100×100 matrix?
- b) a $100,000 \times 100,000$ matrix?
- c) a $1,000,000 \times 1,000,000$ matrix?

(Hint: $1/12$ is approximately 0.083, there are 3600 seconds in an hour, and there are 365 days in a year.)

(Hint 2: You should feel very comfortable giving a very rough answer.)