

Complex Matrix Manipulation Algorithms

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1 Exponentials

$$e^a = \sum_{n=1}^{\infty} \frac{x^n}{n!}$$

One way to calculate this would be to calculate the factorials and powers separately before adding them together. This could be done with a for loop with: or recursively with:

One problem with this is that there is a limit to the size of a number that a computer can store (with simple methods), and even using the `long long int` type, the largest factorial that can be calculated is `fact(15)`, meaning you can only do 15 iterations, giving a result with an error of

%.

Alternatively, you could do each division of the factorial immediately after the power, reducing the overall size of the numbers used in each step:

$$\begin{aligned} e^A &= \sum_{n=1}^{\infty} step^n \\ step^n &= step^{n-1} \times \frac{A}{n} \\ step^1 &= 1 \end{aligned} \tag{1}$$