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Algorithms II
SS 2023

Exercise 3

Task 1
Perform a division with remainder with Newton's method for $s = 87$ and $t = 7$.

Task 2
Let $A \in \mathbb{C}^{n \times n}$ be a matrix.

1. (Slide 61) Show that the coefficient s_1 of the characteristic polynomial $\det(x \cdot \mathrm{Id} - A) = x^n - s_1 x^{n-1} + \cdots$ is equal to the trace of A, which is the sum of the diagonal elements of A.

2. (Lemma 12) Let $\lambda_1, \ldots, \lambda_n \in \mathbb{C}$ be the eigenvalues of A ($\lambda_i = \lambda_j$ is allowed). Show that $\lambda_1^m, \ldots, \lambda_n^m$ are the eigenvalues of A^m for $m \in \mathbb{N}$.

Task 3
Invert the following matrix A using Csansky's algorithm.

$$A = \begin{pmatrix} 2 & 2 \\ 2 & 1 \end{pmatrix}$$