

## Aflevering i uge 6

### Opgave 9.2.7

Det er givet følgende  $3 \times 3$ -matrix:

$$A = \begin{pmatrix} 1 & i & 1-i \\ 1 & 1 & 1+i \\ 0 & -1+i & 1 \end{pmatrix}.$$

Ved brug af Gauss-Jordanelimination, vil jeg nu bestemme den inverse matrix til A. Jeg får følgende:

$$\begin{aligned} & \left( \begin{array}{ccc|ccc} 1 & i & 1-i & 1 & 0 & 0 \\ 1 & 1 & 1+i & 0 & 1 & 0 \\ 0 & -1+i & 1 & 0 & 0 & 1 \end{array} \right) \\ \sim & \left( \begin{array}{ccc|ccc} 1 & i & 1-i & 1 & 0 & 0 \\ 0 & 1-i & 2i & -1 & 1 & 0 \\ 0 & -1+i & 1 & 0 & 0 & 1 \end{array} \right) \\ \sim & \left( \begin{array}{ccc|ccc} 1 & i & 1-i & 1 & 0 & 0 \\ 0 & 1-i & 2i & -1 & 1 & 0 \\ 0 & 0 & 1+2i & -1 & 1 & 1 \end{array} \right) \\ \sim & \left( \begin{array}{ccc|ccc} 1 & i & 1-i & 1 & 0 & 0 \\ 0 & 1-i & 2i & -1 & 1 & 0 \\ 0 & 0 & 1 & -\frac{1}{5} + \frac{2}{5}i & \frac{1}{5} - \frac{2}{5}i & \frac{1}{5} - \frac{2}{5}i \end{array} \right) \\ \sim & \left( \begin{array}{ccc|ccc} 1 & i & 1-i & 1 & 0 & 0 \\ 0 & 1-i & 0 & -\frac{1}{5} + \frac{2}{5}i & \frac{9}{5} + \frac{2}{5}i & -\frac{4}{5} - \frac{2}{5}i \\ 0 & 0 & 1 & -\frac{1}{5} + \frac{2}{5}i & \frac{1}{5} - \frac{2}{5}i & \frac{1}{5} - \frac{2}{5}i \end{array} \right) \\ \sim & \left( \begin{array}{ccc|ccc} 1 & i & 1-i & 1 & 0 & 0 \\ 0 & 1 & 0 & -\frac{3}{10} + \frac{1}{10}i & \frac{3}{10} - \frac{1}{10}i & -\frac{1}{5} - \frac{3}{5}i \\ 0 & 0 & 1 & -\frac{1}{5} + \frac{2}{5}i & \frac{1}{5} - \frac{2}{5}i & \frac{1}{5} - \frac{2}{5}i \end{array} \right) \\ \sim & \left( \begin{array}{ccc|ccc} 1 & i & 0 & \frac{4}{5} - \frac{3}{5}i & \frac{1}{5} + \frac{3}{5}i & \frac{1}{5} + \frac{3}{5}i \\ 0 & 1 & 0 & -\frac{3}{10} + \frac{1}{10}i & \frac{3}{10} - \frac{1}{10}i & -\frac{1}{5} - \frac{3}{5}i \\ 0 & 0 & 1 & -\frac{1}{5} + \frac{2}{5}i & \frac{1}{5} - \frac{2}{5}i & \frac{1}{5} - \frac{2}{5}i \end{array} \right) \\ \sim & \left( \begin{array}{ccc|ccc} 1 & 0 & 0 & \frac{9}{10} - \frac{3}{10}i & \frac{1}{10} + \frac{3}{10}i & -\frac{2}{5} + \frac{4}{5}i \\ 0 & 1 & 0 & -\frac{3}{10} + \frac{1}{10}i & \frac{3}{10} - \frac{1}{10}i & -\frac{1}{5} - \frac{3}{5}i \\ 0 & 0 & 1 & -\frac{1}{5} + \frac{2}{5}i & \frac{1}{5} - \frac{2}{5}i & \frac{1}{5} - \frac{2}{5}i \end{array} \right). \end{aligned}$$

Altså gælder der, at

$$A^{-1} = \frac{1}{10} \begin{pmatrix} 9-3i & 1+3i & -4+8i \\ -3+i & 3-i & -2-6i \\ -2+4i & 2-4i & 2-4i \end{pmatrix}.$$