

# Week 5 – MATH1012

## Practical Class

# Summary

Invertible Matrices:

Determinants: Geometric Meaning, Properties:

$$\text{Det}(AB) = \text{Det}(A) * \text{Det}(B)$$

$$\text{Det}(A^T) = \text{Det}(A)$$

Know how to compute:

Kernel (Nullspace)

Image (Column Space)

$$\begin{aligned} & \underline{E_x} / \left( \underbrace{\begin{pmatrix} 1 & -2 & 1 & 1 & 0 & 0 \\ -3 & 7 & -6 & 0 & 1 & 0 \\ 2 & -3 & 0 & 0 & 0 & 1 \end{pmatrix}}_A \right) \xrightarrow{\substack{R_2 + 3R_1 \rightarrow R_2 \\ R_3 - 2R_1 \rightarrow R_3}} \left( \begin{pmatrix} 1 & -2 & 1 & 1 & 0 & 0 \\ 0 & 1 & -3 & 3 & 1 & 0 \\ 0 & 1 & -2 & -2 & 0 & 1 \end{pmatrix} \right) \\ & \xrightarrow{-R_2 + R_3 \rightarrow R_3} \left( \begin{pmatrix} 1 & -2 & 1 & 1 & 0 & 0 \\ 0 & 1 & -3 & 3 & 1 & 0 \\ 0 & 0 & 1 & -5 & -1 & 1 \end{pmatrix} \right) \xrightarrow{\substack{3R_3 + R_2 \rightarrow R_2 \\ R_1 - R_3 \rightarrow R_1}} \left( \begin{pmatrix} 1 & -2 & 0 & 6 & 1 & 0 \\ 0 & 1 & 0 & -12 & -2 & 3 \\ 0 & 0 & 1 & -5 & -1 & 1 \end{pmatrix} \right) \\ & \xrightarrow{R_1 + 2R_2 \rightarrow R_1} \left( \begin{pmatrix} 1 & 0 & 0 & -18 & -3 & 6 \\ 0 & 1 & 0 & -12 & -2 & 3 \\ 0 & 0 & 1 & -5 & -1 & 1 \end{pmatrix} \right) \end{aligned}$$

# Sources

Image on Page 2 – Trefor Bazett