

# Some Additional Properties

**PROP 5:** Subtracting a multiple of one row of  $A$  from another does not change  $\det A$ .

Proof:

$$\det \begin{bmatrix} a - lb \\ b \\ \vdots \\ f \end{bmatrix} = \det \begin{bmatrix} a \\ b \\ \vdots \\ f \end{bmatrix} - l \underbrace{\det \begin{bmatrix} b \\ b \\ \vdots \\ f \end{bmatrix}}_{0 \text{ by PROP 4}} = \det A$$

**PROP 6:** If  $A$  has a zero row, then  $\det A = 0$ .

Proof: Add any row of  $A$  to its zero row. This does not change  $\det A$  but it produces a matrix with two identical rows. Now use PROP 4.