Properties of Determinants

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- If **A** and **B** are square matrices of order n, then $\det(\mathbf{AB}) = \det(\mathbf{A})\det(\mathbf{B})$
- All row operations are extended to columns
- Let $(\mathbf{A}) = n$ and c be a scalar, then $\det(c\mathbf{A}) = c^n \det(\mathbf{A})$
- **A** is invertible iff the determinant of $\mathbf{A} \neq 0$
- Fundamental Theorem (version II)

  1. If **A** is an nxn matrix, then the following conditions are equivalent:
     (a) **A** is invertible
     (b) $\mathbf{A}x = \mathbf{B}$ has a unique solution for any nx1 column matrix **B**
     (c) $\mathbf{A}x = 0$ has only trivial solution $x = 0$
     (d) $\mathbf{A}\ \widetilde{R}\mathrm{I}_n$
     (e) **A** can be written as a product of elementary matrices
     (f) $\det(\mathbf{A}) \neq 0$