

# Linear Algebra

MA 242 (Spring 2013)

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## DETERMINANT

– properties –

Let  $A = (a_{ij})_{i,j=1,\dots,n}$  be an  $n \times n$  matrix.

- **Determinant and row operations:**

$$\det(EA) = \det(E) \det(A)$$

where if

$$\dots E \text{ is a row interchange: } \det(E) = -1$$

$$\dots E \text{ is a row scaling by } r: \det(E) = r$$

$$\dots E \text{ is row replacement: } \det(E) = 1$$

- **Determinant and the row echelon form:**

$$\det(A) =$$

- **Determinant and invertibility:**

$$A \text{ invertible if and only if } \det(A) \neq 0.$$

- **Determinant and formula for the inverse:**

If  $A$  is invertible

$$A^{-1} = \frac{1}{\det(A)} \text{adj}(A)$$

where the adjoint is defined by

$$\text{adj}(A) =$$

- **Determinant of transpose:**  $\det(A) = \det(A^T)$

- **Determinant of products:**  $\det(AB) = \det(A) \det(B)$