

## Lecture 30: March 18, 2016

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## 30.1 Applications of Determinants

**Definition 30.1** Let  $A$  be an  $n \times n$  matrix. The co-factor matrix,  $\text{cof } A$ , of  $A$  is the matrix whose  $ij$ -th entry is the  $ij$ -th cofactor of  $A$

$$(\text{cof } A)_{ij} = C_{ij}$$

**Definition 30.2** Let  $A$  be an  $n \times n$  matrix. The adjugate of  $A$  is the matrix defined by

$$(\text{adj } A)_{ij} = C_{ji}$$

In particular,  $\text{adj } A = (\text{cof } A)^T$

This Shows  $A^{-1} = \frac{1}{\det A} \text{adj } A$ .

## 30.2 Cramer's Rule

**Theorem 30.3** If  $A$  is an  $n \times n$  invertible matrix, then the solution  $\vec{x}$  of  $A\vec{x} = \vec{b}$  is given by

$$x_i = \frac{\det A_i}{\det A}, 1 \leq i \leq n$$

**End of Lecture Notes**  
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