

### Definitions of Matrix Multiplication

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If  $A = [a_{ij}]$  is an  $m \times n$  matrix and  $B = [b_{ij}]$  is an  $n \times p$  matrix, then the **product**  $AB$  is an  $m \times p$  matrix

$$AB = [c_{ij}]$$

where

$$c_{ij} = \sum_{k=1}^n a_{ik}b_{kj} = a_{i1}b_{1j} + a_{i2}b_{2j} + a_{i3}b_{3j} + \cdots + a_{in}b_{nj}$$