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# International Institute for Technology and Management

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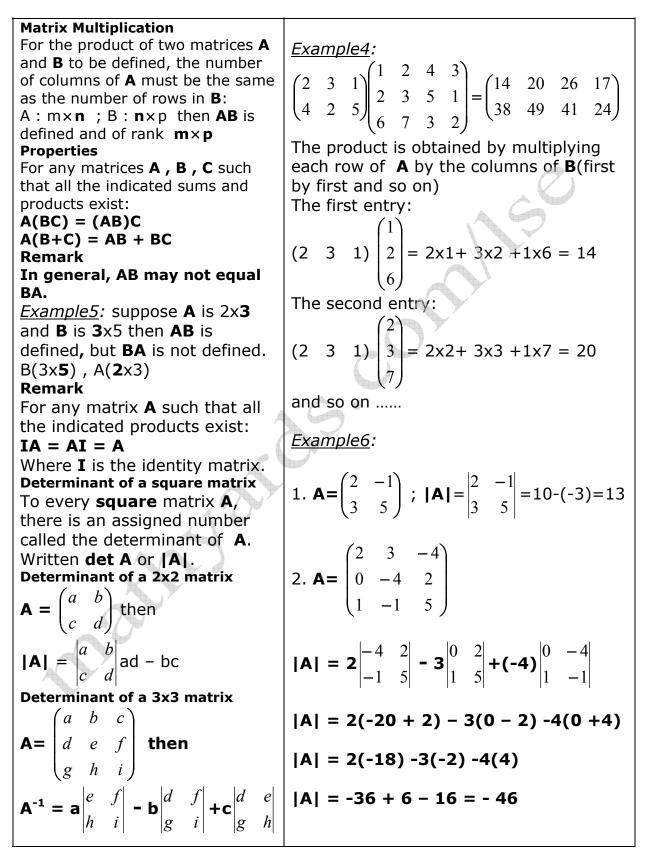
Unit 76: Management Mathematics



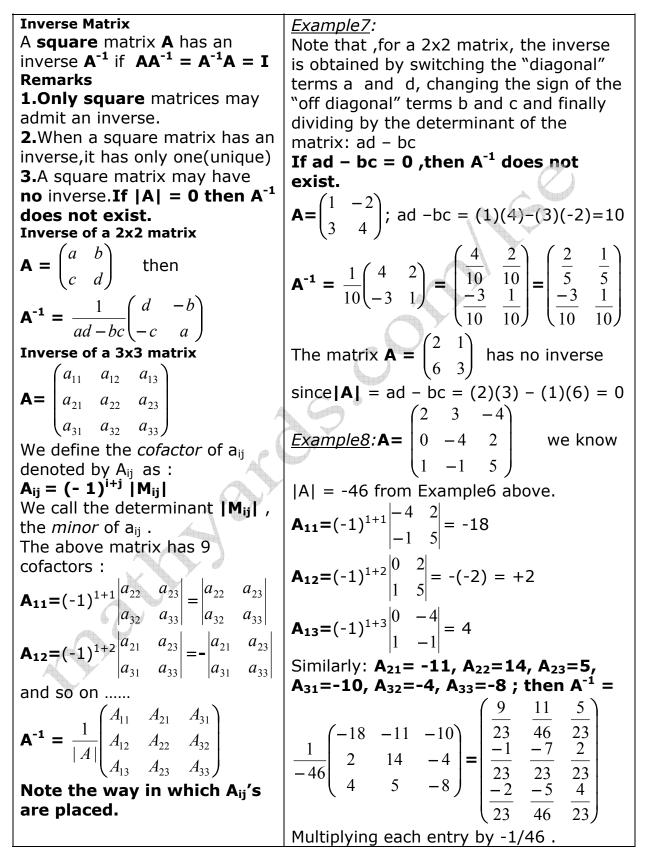
Handout #7a

#### **Applications of Matrices** Dowling ET ,Schaum's Outline series: Introduction to mathematical economics Chapters 10, 11 Interpretation Topic **Matrix Definition** A matrix is an array of numbers: Example1: $\mathbf{A} = \begin{pmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ a_{n1} & a_{n2} & \dots & a_{nn} \end{pmatrix}$ $\mathbf{A} = \begin{pmatrix} 2 & 0 \\ -5 & 3 \end{pmatrix} \text{ is } \mathbf{2} \times \mathbf{2}$ $\mathbf{B} = \begin{pmatrix} 3 & 0 & -1 \\ 6 & 8 & 2 \\ 1 & 0 & 7 \end{pmatrix} \text{ is } \mathbf{4} \times \mathbf{3}$ Matrices are denoted by capital letters : **A**,**B**,**C**,.... Matrix size or rank is determined by the number of rows $\times$ the number of columns it has. **C** = $(1 \ 6 \ 5 \ -2 \ 3)$ is **1** × **5** We say **A** has **m** rows and **n** columns or it is an **m**×**n** matrix. Example2: Square Matrix A matrix with the same number of rows as columns: $2 \times 2$ , $3 \times 3$ , $4 \times 4$ $\mathbf{I} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ is the **2** × **2** Identity matrix are all square matrices. **Identity Matrix** Has **1** in each of the positions in $\mathbf{I} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$ is the **3** × **3** Identity matrix the main diagonal and **0** elsewhere. **Note that** : **I** is a Square matrix. **Matrix Addition** If **A** and **B** are two matrices of Example3: the same size then we define **A+B** to be the matrix whose elements are the sums of the corresponding $\begin{vmatrix} 2 & 3 & -1 \\ 0 & 3 & 7 \\ -9 & 1 & -6 \\ 3 & 0 & 5 \end{vmatrix} + \begin{vmatrix} 3 & 4 & 1 \\ 1 & 5 & 4 \\ 4 & 5 & 1 \\ 1 & 4 & 5 \end{vmatrix} = \begin{vmatrix} 7 & 9 & 0 \\ 1 & 8 & 11 \\ -5 & 6 & -5 \\ 4 & 4 & 10 \end{vmatrix}$ elements in **A** and **B**. Only matrices of the same size can be added. A + (B + C) = (A+B)+C $\mathbf{A} - \mathbf{B} = \mathbf{A} + (-\mathbf{B})$ k(A+B) = kA + kB

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