

# MATH 210 FINITE MATHEMATICS

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## 2.4 Matrices

### Definition 1: Matrix

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### Example 1

Consider the matrix

$$A = \begin{bmatrix} -3 & 5 & 1/3 & 6 \\ 9 & 21 & -2 & 0.2 \\ 1/2 & -9 & 16 & 0 \end{bmatrix}$$

1. How many rows?
2. How many columns?
3. Size?
4. Find

(a)  $a_{11}$

(c)  $a_{32}$

(e)  $a_{24}$

(b)  $a_{34}$

(d)  $a_{21}$

(f)  $a_{13}$

**Definition 2: Row Matrix**

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**Definition 3: Column Matrix**

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**Definition 4: Matrix Equality**

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**Example 2**

Find  $x$ ,  $y$ , and  $z$  so that the following matrices are equal.

$$\begin{bmatrix} 1 & 2x - 1 & 9 \\ 7 & z + 1 & 0 \end{bmatrix} = \begin{bmatrix} 1 & 5 & 9 \\ y & 4 & 0 \end{bmatrix}$$

**Definition 5: Matrix Addition and Subtraction**

- 1.
- 2.

**Example 3**

Perform the indicated operations

$$1. \begin{bmatrix} 0 & 9 \\ 4 & 14 \\ -12 & 6 \end{bmatrix} + \begin{bmatrix} -8 & 0 \\ 5 & -10 \\ 7 & 100 \end{bmatrix}$$

$$2. \begin{bmatrix} 12 & 2 & -9 \\ 1/2 & 0 & 12 \end{bmatrix} - \begin{bmatrix} -2 & 4 & 7 \\ 1/2 & -6 & 10 \end{bmatrix}$$

**Definition 6: Transpose of a Matrix**

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**Example 4**

Find the transpose of

$$A = \begin{bmatrix} -6 & 0 \\ 15 & 0 \\ 1/2 & -3 \end{bmatrix}$$

**Definition 7: Scalar Multiplication**

- 1.
- 2.
- 3.

**Example 5**

If  $M = \begin{bmatrix} 0 & 2 & 4 & -2 \\ 5 & -1 & 9 & 1/2 \\ 16 & -5 & 8 & 7 \end{bmatrix}$  find:

1.  $2M$

2.  $-\frac{1}{3}M$

**Example 6**

Solve for  $u$ ,  $x$ ,  $y$ , and  $z$ .

$$\begin{bmatrix} x & -2 \\ 3 & y \end{bmatrix} - \begin{bmatrix} 2 & -z \\ 1 & -2 \end{bmatrix} = 2 \begin{bmatrix} 2 & -1 \\ u & 2 \end{bmatrix}$$