

- Matrices are arrays of numbers.
- Suppose A is a matrix of dimensions $m \times n$ (i.e. m rows and n columns).

$$\circ A = \begin{pmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{pmatrix}$$

- **Zero Matrix:** A matrix with entries of only 0

$$\circ \text{Example: } 3 \times 2 \text{ zero matrix } 0_{3,2} = \begin{pmatrix} 0 & 0 \\ 0 & 0 \\ 0 & 0 \end{pmatrix}$$

- Any matrix multiplied by a zero matrix is another zero matrix.

- **Identity Matrix:** A square matrix with entries of 1 on its diagonal and 0 elsewhere

$$\circ \text{Example: } 3 \times 3 \text{ identity matrix } I_3 = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}.$$

- Any matrix multiplied by the identity matrix is itself. $A = IA = AI$

- **Elementary Matrix:** A square matrix that is one row operation away from the identity matrix.

- The row operations refer to those used in Gaussian elimination