

# Organizing Data Using Matrices Notes

## Matrices:

A matrix is a rectangular array of mathematical entities such as number, algebraic expression, trigonometric function, etc., enclosed by bracket or parentheses. Matrices are denoted by writing the array or by capital letters. Any of the expressions making up the array is called an element of the matrix.

### Example:

$$A = \begin{bmatrix} 2 & 8 & -3 \\ 0 & 5 & 1 \end{bmatrix}$$

Where  $\begin{bmatrix} 2 & 8 & -3 \end{bmatrix}$  row 1 and  $\begin{bmatrix} 0 & 5 & 1 \end{bmatrix}$  row 2

And  $\begin{bmatrix} 2 \\ 0 \end{bmatrix}$  column 1;  $\begin{bmatrix} 8 \\ 5 \end{bmatrix}$  column 2 and  $\begin{bmatrix} -3 \\ 1 \end{bmatrix}$  column 3.

The given example is a  $2 \times 3$  matrix which have 2 rows and 3 columns.

**Sample Problem 1:** Find the element of the following matrices.

1. Find  $M_{23}$

$$M = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 0 & 2 \\ 9 & 4 & 2 \end{bmatrix}$$

$$M_{23} = 2$$

2. Find  $F_{12}$

$$F = \begin{bmatrix} 2 & 6 & -2 \\ 2 & -4 & 5 \end{bmatrix}$$

$$F_{12} = 6$$

3. Find  $H_{22}$

$$H = \begin{bmatrix} -1 & 4 \\ -3 & 5 \\ 2 & 6 \end{bmatrix}$$

$$H_{22} = 5$$

4. Find  $G_{13}$

$$G = \begin{bmatrix} -1 & 2 & 3 \\ -4 & 5 & 7 \end{bmatrix}$$

$$G_{13} = 3$$

**Sample Problem 2:** Solve the following problem Involving matrices.

5. The matrix below shows the grade of three male students in math (M), science (S) and English (E).

	M	S	E
John	80	86	89
Ben	81	80	85
Jin	78	85	87

- What is John's Grade in Math? 80
- What is Jin's Grade in English? 87
- What is Ben's Grade in Science? 81
- What is Jin's lowest grade and what subject? 78 in Math
- What is John's highest grade and what subject? 89 in English

## Organizing Data Using Matrices Notes

- f. Who got the lowest grade in English? **Ben**  
 g. Who got the highest grade in science? **John**

6. The matrix below shows the preferred drinks and snack of the student's in school Y during break time. Snacks: sandwiches (s), sausages (h) and biscuits (b); drinks: colas (C), juices (J) and shakes (S).

$$\begin{matrix} & \text{C} & \text{J} & \text{S} \\ \text{s} & \begin{bmatrix} 17 & 18 & 30 \end{bmatrix} \\ \text{h} & \begin{bmatrix} 15 & 20 & 27 \end{bmatrix} \\ \text{b} & \begin{bmatrix} 25 & 35 & 23 \end{bmatrix} \end{matrix}$$

- a. How many preferred sandwiches?  $(17+18+30)=65$   
 b. How many preferred sausages?  $(15+20+27)=62$   
 c. How many preferred biscuits and juices? **35**  
 d. How many preferred sausages and colas? **15**  
 e. How many preferred biscuits or shakes?  $(25+35+23)+(30+27+23)-23 = 83 + 80 - 23 = 140$   
 f. How many preferred sausages or colas?  $(15+20+27) + (17+15+25)-15 = 62 + 57 - 15 = 104$

**Sample Problem 3:** Identify the element of a matrix given the following data.

7. Below is the result of the National Achievement test of the following school in division X.

	2003	2004	2005	2006
School A	80	81.5	82	82.3
School B	81	81.3	81.22	82.1
School C	79.2	78.9	78.92	80.1
School D	73.5	75.6	77.9	72.5

$$S = \begin{bmatrix} 80 & 81.5 & 82 & 82.3 \\ 81 & 81.3 & 81.22 & 82.1 \\ 79.2 & 78.9 & 78.92 & 80.1 \\ 73.5 & 75.6 & 77.9 & 72.5 \end{bmatrix}$$

- a. Identify element  $S_{22}$ . What does it represent? **81.3, school b result by year 2004**  
 b. Identify element  $S_{43}$ . What does it represent? **77.9, school d result by year 2005**

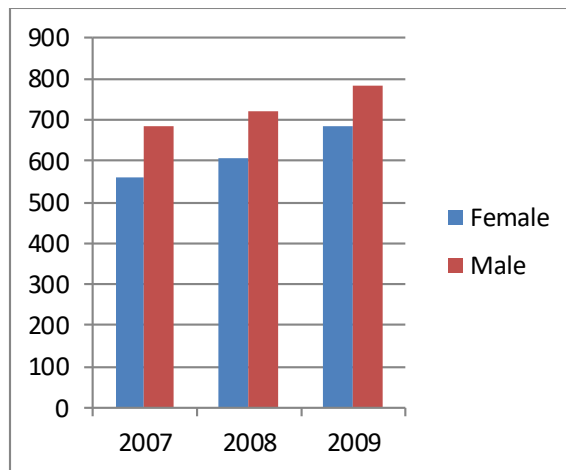
# Organizing Data Using Matrices Notes

**Sample Problem 4:** Organized the following data by constructing matrices.

8. Liza got 86 in math and 89 in English while Erika got 92 in math and 87 in English. Construct a 2 X 2 matrix.

$$\begin{array}{cc} & \text{M} & \text{E} \\ \text{Liza} & 86 & 89 \\ \text{Erika} & 92 & 87 \end{array} \Rightarrow G = \begin{bmatrix} 86 & 89 \\ 92 & 87 \end{bmatrix}$$

9. Below is a table that contains the number of enrollees of school X from 2007 to 2009. Construct a 3 X 2 matrix of year and the number of students.



$$\begin{array}{cc} & \text{F} & \text{M} \\ 2007 & 560 & 690 \\ 2008 & 600 & 720 \\ 2009 & 690 & 780 \end{array} \Rightarrow F = \begin{bmatrix} 560 & 690 \\ 600 & 720 \\ 690 & 780 \end{bmatrix}$$

10. Below is the anticipated temperature in degree Celsius for the last three days of the week. Construct a 3 X 3 matrix of the day and temperature.

Day	Morning	Afternoon	Evening
Friday	10	18	13
Saturday	12	19	14
Sunday	15	22	14

$$\begin{array}{cc} & \text{M} & \text{S} & \text{SU} \\ \text{Friday} & 10 & 18 & 13 \\ \text{Saturday} & 12 & 19 & 14 \\ \text{Sunday} & 15 & 22 & 14 \end{array} \Rightarrow H = \begin{bmatrix} 10 & 18 & 13 \\ 12 & 19 & 14 \\ 15 & 22 & 14 \end{bmatrix}$$