



MATRICES IN THE AVIATION INDUSTRY

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ABSTRACT

Matrices or matrix is commonly used in mathematics, but have you thought about how important it is or where you can use it? Ever wondered where the word matrix came from? Matrix is actually a Latin word used for the womb it is also used to express something that is formed or produced. Matrices are used a lot in daily life but its applications are usually not discussed in class. Therefore, we have brought to you the importance and the application of math's through matrices in a simple form

INTRODUCTION

An aircraft is a vehicle that is able to fly by gaining support from the air. It counters the force of gravity by using either static lift or by using the dynamic lift of an airfoil, or in a few cases the downward thrust from jet engines. The human activity that surrounds aircraft is called aviation.

Problem:

An Airline company has three types of aircraft (passenger, transport and jumbo) that carry three types of cargo (first class mail, passengers and air freight). The payload of each type is given by the table.

Units Carried	Passenger	Transport	Jumbo
First Class Mail	30	10	20
Passenger	10	10	20
Air Freight	10	30	20

Suppose that on a given day the airline must move 340 units of first-class mail, 180 units of air freight and 220 passengers. How many aircraft of each type should be scheduled?

Reduced Form:

Definition: Reduced Form / Reduced row echelon form.

1. Each row consisting entirely of zeros is below any row having at least one nonzero element.
- 2.The leftmost nonzero element in each row is 1.
- 3.All other elements in the column containing the leftmost 1 of a given row are zeros.
- 4.The leftmost 1 in any row is to the right of the leftmost 1 in the row above.

METHODS AND MATERIALS

Method Used:

In mathematics, a *matrix* (plural matrices) is a rectangular array of numbers, symbols, or expressions, arranged in rows and columns. Matrices are commonly written in box brackets. The horizontal and vertical lines of entries in a matrix are called *rows* and *columns*, respectively. The size of a matrix is defined by the number of rows and columns that it contains. A matrix with *m* rows and *n* columns is called a matrix.

A matrix (whose plural is matrices) is a rectangular array of numbers, symbols, or expressions, arranged in rows and columns.

Material Used:

X Variable Representative:

Let x_1 = number of aircraft of type passenger.
Let x_2 = number of aircraft of type transport.
Let x_3 = number of aircraft of type jumbo.

The mathematical model :

$$30x_1+10x_2+20x_3 = 340$$

$$10x_1+10x_2+20x_3 = 180$$

$$10x_1+30x_2+20x_3 = 180$$

METHODS AND MATERIALS

Augemnted Matrix:

$$\left[\begin{array}{ccc|c} 30 & 10 & 20 & 340 \\ 10 & 10 & 20 & 180 \\ 10 & 30 & 20 & 220 \end{array} \right]$$

Change 30 into 1 ($\frac{1}{30} R1 \rightarrow R1$):

$$\left[\begin{array}{ccc|c} 1 & \frac{1}{3} & \frac{2}{3} & \frac{34}{3} \\ 10 & 10 & 20 & 180 \\ 10 & 30 & 20 & 220 \end{array} \right]$$

Change 10 into 0 ($-10R1+R2 \rightarrow R2$):

$$\left[\begin{array}{ccc|c} 1 & \frac{1}{3} & \frac{2}{3} & \frac{34}{3} \\ 0 & \frac{20}{3} & \frac{40}{3} & \frac{200}{3} \\ 0 & \frac{20}{3} & \frac{40}{3} & \frac{200}{3} \end{array} \right]$$

Change 10 into 0 ($-10R1+R3 \rightarrow R3$):

$$\left[\begin{array}{ccc|c} 1 & \frac{1}{3} & \frac{2}{3} & \frac{34}{3} \\ 0 & \frac{20}{3} & \frac{40}{3} & \frac{200}{3} \\ 0 & \frac{20}{3} & \frac{40}{3} & \frac{200}{3} \end{array} \right]$$

Change $\frac{20}{3}$ into 1 ($\frac{3}{20} R2 \rightarrow R2$):

$$\left[\begin{array}{ccc|c} 1 & \frac{1}{3} & \frac{2}{3} & \frac{34}{3} \\ 0 & 1 & 2 & 10 \\ 0 & \frac{20}{3} & \frac{40}{3} & \frac{200}{3} \end{array} \right]$$

Change $\frac{80}{3}$ into 0 ($-\frac{80}{3} R2+R3 \rightarrow R3$):

$$\left[\begin{array}{ccc|c} 1 & \frac{1}{3} & \frac{2}{3} & \frac{34}{3} \\ 0 & 1 & 2 & 10 \\ 0 & 0 & -40 & -160 \end{array} \right]$$

Change $\frac{1}{3}$ into 0 ($-\frac{1}{3} R2+R1 \rightarrow R1$):

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & 8 \\ 0 & 1 & 2 & 10 \\ 0 & 0 & -40 & -160 \end{array} \right]$$

Change -40 into 1 ($-\frac{1}{40} R3 \rightarrow R3$):

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & 8 \\ 0 & 1 & 2 & 10 \\ 0 & 0 & 1 & 4 \end{array} \right]$$

Change 2 into 0 ($-2R3+R2 \rightarrow R2$)

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & 8 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 4 \end{array} \right]$$

CONCLUSIONS

Solution Set:(One Solution)

$$x_1=8$$

$$x_2=2$$

$$x_3=4$$

There will be scheduled 8 aircrafts with type passenger,2 aircraft with type transport, and 4 aircraft with type jumbo.



REFRENCES:

<https://www.embibe.com/exams/where-are-matrices-used-in-daily-life/>
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