

1. Storing Data in Matrices

Big Idea: Many different types of data, from store inventory to coordinates of 2 dimensional figures, can be stored in matrices.

Rectangular arrangement of object or numbers is called a **matrix**. The plural of *matrix* is **matrices**. Each object in a matrix is called an **element**. For example, the per capita consumption of beverages (in gallons) per year is shown in the matrix below.

| Column 1: 1980 | Column 2: 2000 | Column 3: 2006 | Column 4: 2009 |
|-------------------|-------------------|-------------------|-------------------|
| 17 | 8.1 | 6.7 | 5.9 |
| 7.3 | 7.8 | 8.4 | 9 |
| 7.4 | 8.9 | 7.9 | 7.4 |

Row 1 – Whole Milk
Row 2 – Tea
Row 3 – Fruit juices

Dimensions of a Matrix

These elements are enclosed in large square brackets. This matrix has 3 *rows* (the types of beverages) and four *columns* (the years recorded). This matrix has the **dimensions** 3 by 4, written 3×4 .

Definition: A matrix with “m” rows and “n” columns has dimensions $m \times n$.

Each element is named (or identified) first by its row position, then its column position. For example, the number 8.4 in the matrix above is located in row 2, column 3. Headings are placed outside the square brackets (outside the matrix); they are not part of the calculable values.

You try: What is the element found in row 4, column 1?

Remember: You row “across” a lake and columns hold “up” houses. This may help you keep rows and columns straight!

You try: Go the [US Census Bureau](#). On the left hand side are many different categories. Find a category that is of interest to you. Click on a topic of which you would like to see statistics. Organize your data into a matrix. The number of rows and columns you need is completely up to you. Write your matrix in the space below.

Tech Connection: Spreadsheet software like Excel and Numbers are really matrices. Like handwritten matrices, spreadsheets can have headings to identify their rows and columns.

Example

According to the US Census Bureau, in 2000, there were 543,120 male jail inmates and 70414 female jail inmates. Five years later, there were 646,807 male and 93963 female jail inmates. In 2009, there were 667,039 male and 93,176 female jail inmates.

a) Store this into a handmade matrix.

b) What are the dimensions of the matrix you created?

What are the matrix possibilities our class came up with? What are the dimensions of each example?

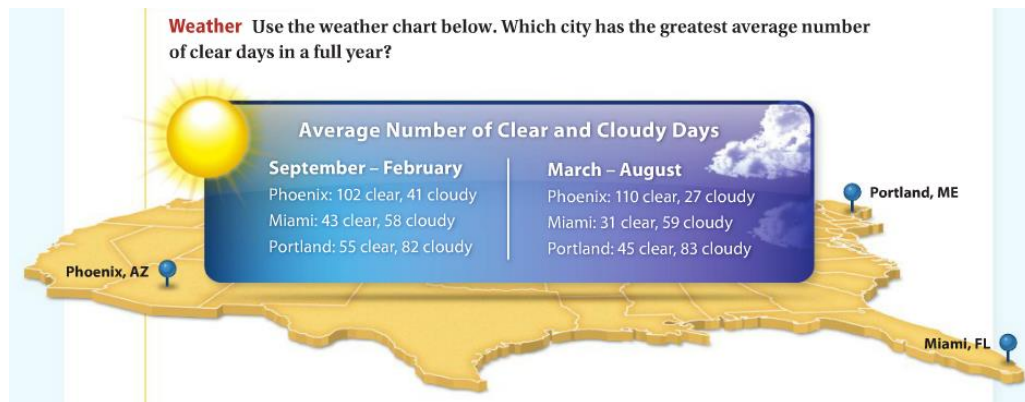
Although these matrices store the same data, they are not considered equal. Matrices are **equal** if and only if they have the same dimensions and their corresponding elements are the same.

Define *corresponding*:

Matrix Addition

Storing information is only one function of a matrix. Through basic operations, you can calculate many things. For example, you may need to adjust store inventory due to a delivery. Maybe you need to organize everyone's timesheet to calculate the number of hours worked or want to give all your employees a 2% raise. Matrices help make these calculations more time effective than doing them by hand.

For example, use the information below to answer the question.



Matrix addition is calculated using the following format.

If two matrices (called A and B) have the same *dimensions*, their **sum** is the matrix in which each element of matrix A is added to its corresponding element in matrix B.

Tech Connection: Calculators like the TI can add, subtract and multiply matrices.

You try: Enter the cloudy day data for Phoenix, Miami and Portland into your calculator as matrix [A]. Enter the clear day data as matrix [B]. Find the sum.