```
mtr =
     5    78     4    24     9
     4     0    36    60    12
    56    13     5    89     3
>> mtr(:,2:4)=[]
mtr =
     5     9
     4    12
    56     3
>>
```

Eliminate all the rows of columns 2 through 4.

2.9 BUILT-IN FUNCTIONS FOR HANDLING ARRAYS

MATLAB has many built-in functions for managing and handling arrays. Some of these are listed below:

Table 2-2: Built-in functions for handling arrays

Function	Description	Example

`length(A)`	Returns the number of elements in the vector `A`.	`>> A=[5 9 2 4];`
		`>> length(A)`
		`ans =`
		`4`

`size(A)`	Returns a row vector `[m,n]`, where `m` and `n` are the size $m \times n$ of the array `A`.	`>> A=[6 1 4 0 12; 5 19 6 8 2]`
		`A =`
		`6 1 4 0 12`
		`5 19 6 8 2`
		`>> size(A)`
		`ans =`
		`2 5`

`reshape(A, m,n)`	Creates a `m` by `n` matrix from the elements of matrix `A`. The elements are taken column after column. Matrix `A` must have `m` times `n` elements.	`>> A=[5 1 6; 8 0 2]`
		`A =`
		`5 1 6`
		`8 0 2`
		`>> B = reshape(A,3,2)`
		`B =`
		`5 0`
		`8 6`
		`1 2`

Table 2-2: Built-in functions for handling arrays (Continued)

Function	Description	Example

`diag(v)`	When `v` is a vector, creates a square matrix with the elements of `v` in the diagonal.	`>> v=[7 4 2];`
		`>> A=diag(v)`
		`A =`
		`7 0 0`
		`0 4 0`
		`0 0 2`

`diag(A)`	When `A` is a matrix, creates a vector from the diagonal elements of `A`.	`>> A=[1 2 3; 4 5 6; 7 8 9]`
		`A =`
		`1 2 3`
		`4 5 6`
		`7 8 9`
		`>> vec=diag(A)`
		`vec =`
		`1`
		`5`
		`9`

Additional built-in functions for manipulation of arrays are described in the Help Window. In this window, select "MATLAB," then in the Contents "Functions," and then "By Category."

Sample Problem 2-1: Create a matrix

Using the ones and zeros commands, create a 4×5 matrix in which the first two rows are 0s and the next two rows are 1s.

Solution

```
>> A(1:2,:)=zeros(2,5)
A =
     0     0     0     0     0
     0     0     0     0     0
>> A(3:4,:)=ones(2,5)
A =
     0     0     0     0     0
     0     0     0     0     0
     1     1     1     1     1
     1     1     1     1     1
```

First, create a 2×5 matrix with 0s.

Add rows 3 and 4 with 1s.

A different solution to the problem is:

```
>> A=[zeros(2,5);ones(2,5)]
A =
     0     0     0     0     0
     0     0     0     0     0
     1     1     1     1     1
     1     1     1     1     1
```

Create a 4×5 matrix from two 2×5 matrices.

Sample Problem 2-2: Create a matrix

Create a 6×6 matrix in which the middle two rows and the middle two columns are 1s and the rest of the entries are 0s.

Solution

```
>> AR=zeros(6,6)
AR =
     0     0     0     0     0     0
     0     0     0     0     0     0
     0     0     0     0     0     0
     0     0     0     0     0     0
     0     0     0     0     0     0
     0     0     0     0     0     0
>> AR(3:4,:)=ones(2,6)
AR =
     0     0     0     0     0     0
     0     0     0     0     0     0
     1     1     1     1     1     1
     1     1     1     1     1     1
     0     0     0     0     0     0
     0     0     0     0     0     0
>> AR(:,3:4)=ones(6,2)
AR =
     0     0     1     1     0     0
     0     0     1     1     0     0
     1     1     1     1     1     1
     1     1     1     1     1     1
     0     0     1     1     0     0
     0     0     1     1     0     0
```

First, create a 6×6 matrix with 0s.

Reassign the number 1 to the 3rd and 4th rows.

Reassign the number 1 to the 3rd and 4th columns.

Sample Problem 2-3: Matrix manipulation

Given are a 5×6 matrix A, a 3×6 matrix B, and a 9-element vector v.

$$ma = \begin{bmatrix} 2 & 5 & 8 & 11 & 14 & 17 \\ 3 & 6 & 9 & 12 & 15 & 18 \\ 4 & 7 & 10 & 13 & 16 & 19 \\ 5 & 8 & 11 & 14 & 17 & 20 \\ 6 & 9 & 12 & 15 & 18 & 21 \end{bmatrix} \qquad B = \begin{bmatrix} 5 & 10 & 15 & 20 & 25 & 30 \\ 30 & 35 & 40 & 45 & 50 & 55 \\ 55 & 60 & 65 & 70 & 75 & 80 \end{bmatrix}$$

$$v = [99 \quad 98 \quad 97 \quad 96 \quad 95 \quad 94 \quad 93 \quad 92 \quad 91]$$

Create the three arrays in the Command Window, and then, by writing one command, replace the last four columns of the first and third rows of A with the first four columns of the first two rows of B, the last four columns of the fourth row of A with the elements 5 through 8 of v, and the last four columns of the fifth row of A with columns 3 through 5 of the third row of B.

Solution

```
>> A=[2:3:17; 3:3:18; 4:3:19; 5:3:20; 6:3:21]
A =
     2     5     8    11    14    17
     3     6     9    12    15    18
     4     7    10    13    16    19
     5     8    11    14    17    20
     6     9    12    15    18    21
>> B=[5:5:30; 30:5:55; 55:5:80]
B =
     5    10    15    20    25    30
    30    35    40    45    50    55
    55    60    65    70    75    80
>> v=[99:-1:91]
v =
    99    98    97    96    95    94    93    92    91
>> A([1 3 4 5],3:6)=[B([1 2],1:4); v(5:8); B(3,2:5)]
```

4×4 matrix made of columns 3 through 6 of rows 1, 3, 4, and 5.

4×4 matrix. The first two rows are columns 1 through 4 of rows 1 and 2 of matrix B. The third row consists of elements 5 through 8 of vector v. The fourth row consists of columns 2 through 5 of row 3 of matrix B.