

How can the Identity Matrix be created in R, and what are some examples of its use?

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The Identity Matrix in R is a square matrix with ones on the main diagonal and zeroes everywhere else. It can be created using the `diag()` function by specifying the desired number of rows and columns. This matrix is commonly used in linear algebra and matrix operations, as it acts as the neutral element for matrix multiplication. Some examples of its use include solving systems of linear equations, finding inverses of matrices, and performing transformations in geometry. It is also used in machine learning for data normalization and in computer graphics for rotation and scaling transformations. Overall, the Identity Matrix is a versatile tool in R that simplifies various mathematical operations and is essential in many fields of study.

Create the Identity Matrix in R (With Examples)

In linear algebra, the identity matrix is a square matrix with ones on the main diagonal and zeros everywhere else.

You can create the identity matrix in R by using one of the following three methods:

```
#create identity matrix using diag()  
diag(5)
```

```
#create identity matrix using diag() with explicit nrow  
argument  
diag(nrow=5)
```

```
#create identity matrix by creating matrix of zeros, then  
filling diagonal with ones  
mat <- matrix(0, 5, 5)
```

```
diag(mat) <- 1
```

Each of these methods lead to the same result.

The following examples show how to use each of these methods in practice.

Example 1: Create Identity Matrix Using diag()

The following code shows how to use the diag() function to create an identity matrix with 5 rows and 5 columns:

```
#create 5x5 identity matrix  
ident <- diag(5)#view matrix  
ident
```

```
1 0 0 0 0  
0 1 0 0 0  
0 0 1 0 0  
0 0 0 1 0  
0 0 0 0 1
```

The result is a 5×5 square matrix with ones on the main diagonal and zeros everywhere else.

Example 2: Create Identity Matrix Using diag(nrow)

The following code shows how to use the `diag(nrow)` function to create a 5×5 identity matrix:

```
#create 5x5 identity matrix  
ident <- diag(nrow=5)#view matrix  
ident
```

```
1 0 0 0 0  
0 1 0 0 0  
0 0 1 0 0  
0 0 0 1 0  
0 0 0 0 1
```

Example 3: Create Identity Matrix in Two Steps

The following code shows how create a 5×5 identity matrix by first creating a 5×5 matrix with all zeros, then converting the main diagonal values to be ones:

```
#create 5x5 matrix with zeros in all positions  
ident <- matrix(0, 5, 5)  
  
#make diagonal values 1  
diag(ident) <- 1
```

#view matrix

ident

1 0 0 0 0

0 1 0 0 0

0 0 1 0 0

0 0 0 1 0

0 0 0 0 1

Notice that each of the three methods produce the exact same identity matrix.

The following articles explain how to perform other common matrix operations in R: