

How can a cross product be calculated in R?

Authored by
stats writer

June 30, 2024

RECOMMENDED CITATION

stats writer (2024). *How can a cross product be calculated in R?*. PSYCHOLOGICAL SCALES. Retrieved from <https://scales.arabpsychology.com/?p=163021>

A cross product in R can be calculated by using the built-in function "crossprod()", which takes two vectors or matrices as input and returns their cross product. Alternatively, the "cross()" function can be used to calculate the cross product between two vectors. In both cases, the resulting cross product will be a vector or matrix, depending on the input. The cross product calculation in R follows the standard mathematical formula and can be used for various applications such as vector geometry, physics, and data analysis.

Calculate a Cross Product in R

Assuming we have vector A with elements (A1, A2, A3) and vector B with elements (B1, B2, B3), we can calculate the cross product of these two vectors as:

Cross Product =

For example, suppose we have the following vectors:

Vector A: (1, 2, 3) Vector B: (4, 5, 6)

We could calculate the cross product of these vectors as:

Cross Product = Cross Product = Cross Product = (-3, 6, -3)

You can use one of the following two methods to calculate the cross product of two vectors in R:

Method 1: Use cross() function from pracma package

```
library(pracma)
```

```
#calculate cross product of vectors A and B
```

```
cross(A, B)
```

Method 2: Define your own function

```
#define function to calculate cross product
```

```
cross <- function(x, y, i=1:3) {
```

```
  create3D <- function(x) head(c(x, rep(0, 3)), 3)
```

```
  x <- create3D(x)
```

```
  y <- create3D(y)
```

```
  j <- function(i) (i-1) %% 3+1
```

```
  return (x*y - x*y)
```

```
}
```

```
#calculate cross product
```

```
cross(A, B)
```

The following examples show how to use each method in practice.

Example 1: Use cross() function from pracma package

The following code shows how to use the cross() function from the package to calculate the cross

product between two vectors:

```
library(pracma)
```

```
#define vectors
```

```
A <- c(1, 2, 3)
```

```
B <- c(4, 5, 6)
```

```
#calculate cross product
```

```
cross(A, B)
```

```
-3 6 -3
```

The cross product turns out to be (-3, 6, -3).

This matches the cross product that we calculated earlier by hand.

Example 2: Define your own function

The following code shows how to define your own function to calculate the cross product between two vectors:

```
#define function to calculate cross product
```

```
cross <- function(x, y, i=1:3) {
```

```
  create3D <- function(x) head(c(x, rep(0, 3)), 3)
```

```
x <- create3D(x)
y <- create3D(y)
j <- function(i) (i-1) %% 3+1
return (x*y - x*y)
}
```

#define vectors

```
A <- c(1, 2, 3)
```

```
B <- c(4, 5, 6)
```

#calculate cross product

```
cross(A, B)
```

```
-3 6 -3
```

The cross product turns out to be (-3, 6, -3).

This matches the cross product that we calculated in the previous example.

Additional Resources

The following tutorials explain how to perform other common tasks in R: