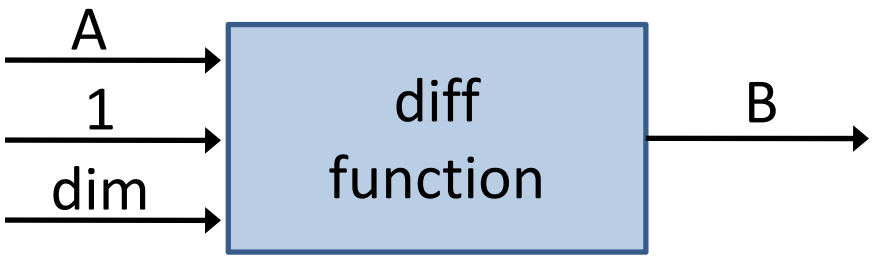
CS 1173: MATLAB diff function

The diff function returns the differences of adjacent elements along an array dimension.

We will always use 1 here!

```
B = diff(A, 1, dim)
```

resulting differences — array to diff — dimension to diff over



Example 1: Different ways to apply diff to array A

```
A = [1, 2, 6; 4, -7, 0];
B = diff(A, 1, 1);
C = diff(A, 1, 2);
```

dim 1 ↓ dim 2 →

$$A = \begin{bmatrix} 1 & 2 & 6 \\ 4 & -7 & 0 \end{bmatrix}$$

B = diff(A, 1, 1) =

$$\begin{bmatrix} 3 & -9 & -6 \end{bmatrix}$$

C = diff(A, 1, 2) =

$$\begin{bmatrix} 1 & 4 \\ -11 & 7 \end{bmatrix}$$

CS 1173: MATLAB diff function (1 argument)

When you call diff with only one argument, diff calculates the first difference along the first non-singleton dimension.

B = diff(A)

resulting difference — array to difference

Example 1: A has both rows and columns

```
A = [1, 2, 6; 4, -7, 0];
B = diff(A(:));
C = diff(A);
```

The first non-singleton dimension is 1

dim 1 ↓ dim 2 →

$$A = \begin{bmatrix} 1 & 2 & 6 \\ 4 & -7 & 0 \end{bmatrix}$$

$$B = \text{diff}(A(:)) = \begin{bmatrix} 3 \\ -2 \\ -9 \\ 13 \\ -6 \end{bmatrix}$$

$$C = \text{diff}(A) = \begin{bmatrix} 3 & -9 & -6 \end{bmatrix}$$

Example 2: A has just one row

```
A = [1, 2, 6];
B = diff(A);
```

The first non-singleton dimension is 2

$$A = \begin{bmatrix} 1 & 2 & 6 \end{bmatrix}$$

$$B = \text{diff}(A) = \begin{bmatrix} 1 & 4 \end{bmatrix}$$

Example 3: A has just one column

```
A = [1; 4];
B = diff(A);
```

The first non-singleton dimension is 1

$$A = \begin{bmatrix} 1 \\ 4 \end{bmatrix}$$

B = diff(A) = 3