Addition and Scalar Multiplication

Addition and subtraction are **element-wise**, so you simply add or subtract each corresponding e

$$\begin{bmatrix} a & bc & d \end{bmatrix} + \begin{bmatrix} w & xy & z \end{bmatrix} = \begin{bmatrix} a+w & b+xc+y & d+z \end{bmatrix}$$

Subtracting Matrices:

$$\begin{bmatrix} a & bc & d \end{bmatrix} - \begin{bmatrix} w & xy & z \end{bmatrix} = \begin{bmatrix} a-w & b-xc-y & d-z \end{bmatrix}$$

To add or subtract two matrices, their dimensions must be **the same**.

In scalar multiplication, we simply multiply every element by the scalar value:

$$\begin{bmatrix} a & bc & d \end{bmatrix} * x = \begin{bmatrix} a*x & b*xc*x & d*x \end{bmatrix}$$

In scalar division, we simply divide every element by the scalar value:

$$\begin{bmatrix} a & bc & d \end{bmatrix} / x = \begin{bmatrix} a/x & b/xc/x & d/x \end{bmatrix}$$

Experiment below with the Octave/Matlab commands for matrix addition and scalar multiplicatic
commands. Try to write out your answers for each command before running the cell below.

```
% Initialize matrix A and B
A = [1, 2, 4; 5, 3, 2]
B = [1, 3, 4; 1, 1, 1]

% Initialize constant s
s = 2

% See how element-wise addition works
add_AB = A + B

% See how element-wise subtraction works
sub_AB = A - B

% See how scalar multiplication works
mult_As = A * s

% Divide A by s
div_As = A / s
% What happens if we have a Matrix + scalar?
add_As = A + s
```