

Assignment #3

For all your work, submit a Notebook (either Jupyter or Colab.)

Using **Tensorflow's Core** functionality, build tensors for the questions below.

<https://www.tensorflow.org/guide/tensor>

Here is a way to create a tensor of rank 2 with Tensorflow:

```
rank_2_tensor = tf.constant([[1, 2],  
                             [3, 4],  
                             [5, 6]], dtype=tf.float16)  
  
print(rank_2_tensor)
```

Task-1

Build a tensor of size 7x7 as follows:

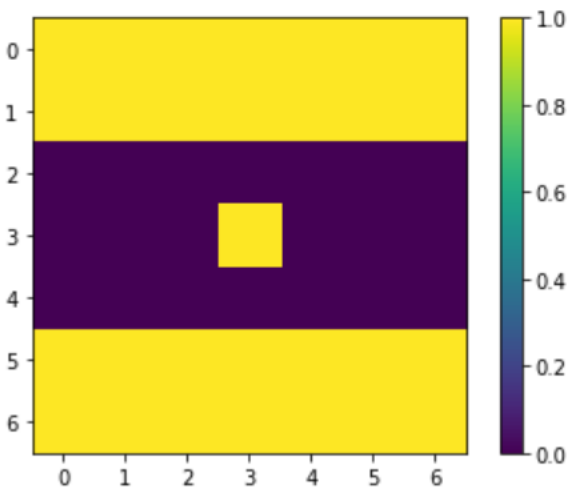
Have zeros (0) everywhere

Assign one (1) in position (3,3)

Place ones (1s) on the first two (2) rows

Also, ones (1s) on the last two (2) rows

Print, plot the tensor, it should look like this (color doesn't have to be the same):



Task-2

Create one-dimensional tensor of size 4. The contents should be the numbers: 1, 2, 3,4

Copy the above one-dimensional five (5) times, i.e., create a tensor of size 5x4. Print the tensor.

Create a 'sliced' tensor of size 4, substituting the above tensor's fourth row (be careful with indexing here!) with the number five (5). Print the original tensor, have its contents changed? Why or why not?

Task-3

Create one-dimensional tensor of size 4. The contents should be the numbers: 1, 2, 3,4

Create a new one-dimensional tensor by subtracting a scalar (- 1) from the original above tensor.

Create a new one-dimensional tensor by adding a scalar (+ 2) from the original above tensor.

Create a new one-dimensional tensor by multiplying a scalar (x 3) from the original above tensor.

Have the contents of the original tensor changed? Why or why not?

Task-4

Perform the exact operations as above (Task-3), this time apply **in-place** operations (i.e. do not create new tensors, instead manipulate the original tensor).

How different (if any) are the results than the ones from Task-3?

Task-5

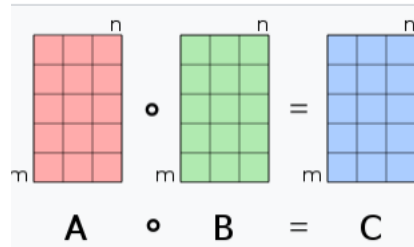
Create two tensors of (3,3,3) size. The contents of the first tensor should be: (1,2,3,4,5,6,7,8,9), (10,11,12,13,14,15,16,17,18), (19,20,21,22,23,24,25,26,27).

The contents of the second tensor should be: (28,29,30,31,32,33,34,35,36), (37,38,39,40,41,42,43,44,45), (46,47,48,49,50,51,52,53,54).

Perform a **tensor Hadamard product** on these two tensors.

Hadamard product (matrices)

The Hadamard product operates on identically shaped matrices and produces a third matrix of the same dimensions.



For example, the Hadamard product for two arbitrary 2×3 matrices is:

$$\begin{bmatrix} 2 & 3 & 1 \\ 0 & 8 & -2 \end{bmatrix} \circ \begin{bmatrix} 3 & 1 & 4 \\ 7 & 9 & 5 \end{bmatrix} = \begin{bmatrix} 2 \times 3 & 3 \times 1 & 1 \times 4 \\ 0 \times 7 & 8 \times 9 & -2 \times 5 \end{bmatrix} = \begin{bmatrix} 6 & 3 & 4 \\ 0 & 72 & -10 \end{bmatrix}$$