ec1-written

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1 Question 1

2 Question 2

2.1 2a

1. a is an integer
2. b is a vector
3. c is a matrix
4. d is a tensor.

2.2 2b

.shape obtains the dimensions of a python object.

2.3 2c

line 1: 1st object of c in the first dimension.
line 2: 1st object of c in the second dimension.
line 3: the last object of c in the first dimension.
line 4: all of the objects of c in the first dimension starting from the 2nd object.
line 5: adds another dimension to the array

2.4 2d

+: element wise addition -: element wise subtraction *: element wise multiplication /: element wise division

2e

.T: matrix transpose
@: matrix multiplication

2.5 2f

matrix wise element multiplication occurs when there are 3 dimensions

2.6 2g

.reshape reorders and restructures the elements of the array so the new array has the specified shape

2.7 2i

f is a variable that points to the same object as d. So when we modify f, we also modify d. However, 'copy' generates a new array where each element is the same as the original. So modifying g doesn't change d.

3 Question 3

4 Question 4

Matrix multiplication in pure Python took 4.387 seconds. Matrix multiplication in NumPy took 0.016 seconds.

Numpy's implementation is faster. This is because Numpy is mostly written in C or C++, and uses vectorized programming, which makes it faster than base python.