Tutorial 01: Python - NumPy (20P)

For the following 10 * 10 array - answer the following 10 questions using NumPy.
Note: Try to avoid the use of explicit for- and while-loops. Use methods from the NumPy library instead, which are intuitive and more runtime-efficient.
Please submit your code by 27th Oct 23:59 to alice.baird@informatik.uni-augsburg.de and manuel.milling@informatik.uni-augsburg.de:

```
A = np.array([[0.69145505, 0.86931882, 0.88576413, 0.82707554, 0.94754421,
0.54767962,  0.51818679, 0.27907936, 0.95212406, 0.22750068],
[0.345638,   0.16172159, 0.87807572, 0.38444467, 0.84255332,
0.69666159,  0.43339905, 0.91927538, 0.58666126, 0.83215206],
[0.91359442, 0.06356911, 0.37205853, 0.18242315, 0.37961342,
0.93335263,  0.34068447, 0.48598708, 0.24260729, 0.70004846],
[0.75245372, 0.64147803, 0.84013461, 0.6152693,  0.02235612,
0.4492574,  0.55206705, 0.69409179, 0.1666939,  0.67387225],
[0.30664677, 0.87559232, 0.07164895, 0.85516997, 0.77945438,
0.51948711,  0.18721151, 0.7690967 , 0.53605078, 0.55431431],
[0.1750064,  0.95009262, 0.57121048, 0.87359026, 0.05715099,
0.43202169,  0.3648696,  0.24367817, 0.06807447, 0.46999578],
[0.41121198, 0.10125657, 0.0869751,  0.91816382, 0.01738795,
0.19420588,  0.00127754, 0.19281699, 0.56083174, 0.55424236],
[0.34467108, 0.18352578, 0.69203741, 0.48087863, 0.39596428,
0.28107969,  0.09727506, 0.11236618, 0.82687268, 0.22700161],
[0.92788092, 0.87184167, 0.72492497, 0.94086364, 0.86998108,
0.35178978,  0.45463869, 0.0242793,  0.75607483, 0.21317889],
[0.15680697, 0.13109825, 0.93463861, 0.78143659, 0.30680001,
0.67935342,  0.3583568,  0.7522564,  0.19810852, 0.22378965]]
```

Exercise 1 (2P)

What is the row index in A that has the largest last element?

Exercise 2 (2P)

What is the row index in A that has the second largest last element?

Exercise 3 (2P)

What is the row index in A that has a row sum greater than 5?

Exercise 4 (2P)

What is the sum of all elements of the form A[i, i+1] in A?

Exercise 5 (2P)

Multiply elementwise every row in matrix A by the vector w [0.49039597 0.73424538 0.08249155 0.0488797 0.62525918 0.29331343 0.76435348 0.68825002 0.53465669 0.3399619], and then sum the results for every row.

Exercise 6 (2P)

Do the above task in 5. using a numpy routine of the matrix multiplication.

Exercise 7 (2P)

Set all elements of A that are larger than 0.5 to 0. What is the sum of the resulting matrix?

Exercise 8 (2P)

Subtract 1 from all elements of A that are smaller than 0.5. What is the sum of the resulting matrix?

Exercise 9 (2P)

What is the sum of all element in A, that are smaller than their column's mean?

Exercise 10 (2P)

Create a diagonal matrix B of size 10*10, with B_i,i = i