Resolução Exercicio Aula 2

```
import numpy as np
import random as rnd
```

Criar função *znorm*:

$$z_{\text{norm}} = \frac{x - min(x)}{max(x) - min(x)}$$

```
def znorm(x):

  return (x - min(x)) / (max(x) - min(x))
```

criar vetores A e B

```
# vetorA = np.arange(1,21) # criando direto com numpy
vetorA = np.array(list(range(1,21))) # metodo apresentado na aula
```

```
vetorA
```

```
array([ 1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16, 17,
       18, 19, 20])
```

```
# vetorB = np.random.randint(1, 21, 20) # criando direto pelo numpy

vetorB = np.array(rnd.sample(range(1,21), 20)) # metodo apresentado na aula
```

```
vetorB
```

```
array([ 2,  9, 12, 15, 19, 16, 10,  5,  1,  6,  4, 13,  3, 11, 20, 14, 17,
        7, 18,  8])
```

Aplicar função

```
vetorA_norm = znorm(vetorA)
vetorA_norm
```

```
array([0.        , 0.05263158, 0.10526316, 0.15789474, 0.21052632,
       0.26315789, 0.31578947, 0.36842105, 0.42105263, 0.47368421,
       0.52631579, 0.57894737, 0.63157895, 0.68421053, 0.73684211,
       0.78947368, 0.84210526, 0.89473684, 0.94736842, 1.        ])
```

```
vetorB_norm = znorm(vetorB)
vetorB_norm
```

```
array([0.05263158, 0.42105263, 0.57894737, 0.73684211, 0.94736842,
       0.78947368, 0.47368421, 0.21052632, 0.        , 0.26315789,
       0.15789474, 0.63157895, 0.10526316, 0.52631579, 1.        ,
       0.68421053, 0.84210526, 0.31578947, 0.89473684, 0.36842105])
```

Criar as matrizes

```
np.shape(vetorA), np.shape(vetorB)
```

```
((20,), (20,))
```

```
np.shape([vetorA, vetorB])
```

```
(2, 20)
```

```
np.shape(np.transpose([vetorA, vetorB]))
```

```
(20, 2)
```

```
matrizAB = np.transpose([vetorA, vetorB])
```

```
matrizAB
```

```
array([[ 1,  2],
       [ 2,  9],
       [ 3, 12],
       [ 4, 15],
       [ 5, 19],
       [ 6, 16],
       [ 7, 10],
       [ 8,  5],
       [ 9,  1],
       [10,  6],
       [11,  4],
       [12, 13],
       [13,  3],
       [14, 11],
       [15, 20],
       [16, 14],
       [17, 17],
       [18,  7],
```

```
           [19, 18],
           [20,  8]])
```

```
1 matrizAB_norm = np.transpose([vetorA_norm, vetorB_norm])
```

```
1 matrizAB_norm
```

```
array([[0.        , 0.05263158],
       [0.05263158, 0.42105263],
       [0.10526316, 0.57894737],
       [0.15789474, 0.73684211],
       [0.21052632, 0.94736842],
       [0.26315789, 0.78947368],
       [0.31578947, 0.47368421],
       [0.36842105, 0.21052632],
       [0.42105263, 0.        ],
       [0.47368421, 0.26315789],
       [0.52631579, 0.15789474],
       [0.57894737, 0.63157895],
       [0.63157895, 0.10526316],
       [0.68421053, 0.52631579],
       [0.73684211, 1.        ],
       [0.78947368, 0.68421053],
       [0.84210526, 0.84210526],
       [0.89473684, 0.31578947],
       [0.94736842, 0.89473684],
       [1.        , 0.36842105]])
```

Aplicar operações

- operação *

```
1 matrizAB*matrizAB_norm
```

```
array([[ 0.        ,  0.10526316],
       [ 0.10526316,  3.78947368],
       [ 0.31578947,  6.94736842],
       [ 0.63157895, 11.05263158],
       [ 1.05263158, 18.        ],
       [ 1.57894737, 12.63157895],
       [ 2.21052632,  4.73684211],
       [ 2.94736842,  1.05263158],
       [ 3.78947368,  0.        ],
       [ 4.73684211,  1.57894737],
       [ 5.78947368,  0.63157895],
       [ 6.94736842,  8.21052632],
       [ 8.21052632,  0.31578947],
       [ 9.57894737,  5.78947368],
       [11.05263158, 20.        ],
       [12.63157895,  9.57894737],
       [14.31578947, 14.31578947],
       [16.10526316,  2.21052632],
       [18.        , 16.10526316],
       [20.        ,  2.94736842]])
```

- Operação dot

```
1 matrizAB.dot(np.transpose(matrizAB_norm))
```

```
          5.68421053, 13.57894737,  5.47368421, 12.52631579, 20.42105263,
         15.68421053, 18.52631579, 10.42105263, 20.        , 11.89473684],
       [ 0.52631579,  4.57894737,  6.52631579,  8.47368421, 10.94736842,
         9.73684211,  6.94736842,  4.68421053,  2.94736842,  5.94736842,
         5.26315789, 10.36842105,  5.47368421, 10.05263158, 15.15789474,
        12.36842105, 14.31578947,  9.42105263, 15.57894737, 10.68421053],
       [ 0.26315789,  2.52631579,  3.73684211,  4.94736842,  6.42105263,
         6.05263158,  4.89473684,  4.        ,  3.36842105,  5.10526316,
         5.        ,  7.78947368,  5.57894737,  8.10526316, 10.89473684,
         9.73684211, 10.94736842,  8.73684211, 12.05263158,  9.84210526],
       [ 0.05263158,  0.89473684,  1.52631579,  2.15789474,  2.84210526,
         3.15789474,  3.31578947,  3.52631579,  3.78947368,  4.52631579,
         4.89473684,  5.84210526,  5.78947368,  6.68421053,  7.63157895,
         7.78947368,  8.42105263,  8.36842105,  9.42105263,  9.36842105],
       [ 0.31578947,  3.05263158,  4.52631579,  6.        ,  7.78947368,
         7.36842105,  6.        ,  4.94736842,  4.21052632,  6.31578947,
         6.21052632,  9.57894737,  6.94736842, 10.        , 13.36842105,
        12.        , 13.47368421, 10.84210526, 14.84210526, 12.21052632],
       [ 0.21052632,  2.26315789,  3.47368421,  4.68421053,  6.10526316,
         6.05263158,  5.36842105,  4.89473684,  4.63157895,  6.26315789,
         6.42105263,  8.89473684,  7.36842105,  9.63157895, 12.10526316,
        11.42105263, 12.63157895, 11.10526316, 14.        , 12.47368421],
       [ 0.68421053,  6.10526316,  8.78947368, 11.47368421, 14.84210526,
        13.42105263,  9.94736842,  7.15789474,  5.05263158,  9.10526316,
```

```
[ 0.36842105,  3.89473684,  5.94736842,  8.        , 10.42105263,
 10.26315789,  9.        ,  8.10526316,  7.57894737, 10.36842105,
 10.57894737, 14.84210526, 12.10526316, 16.        , 20.26315789,
 19.        , 21.05263158, 18.31578947, 23.31578947, 20.57894737],
[ 0.94736842,  8.57894737, 12.42105263, 16.26315789, 21.05263158,
 19.21052632, 14.52631579, 10.78947368,  8.        , 13.73684211,
 12.84210526, 22.36842105, 13.89473684, 22.47368421, 32.        ,
 27.31578947, 31.15789474, 22.68421053, 34.10526316, 25.63157895],
[ 0.42105263,  4.42105263,  6.73684211,  9.05263158, 11.78947368,
 11.57894737, 10.10526316,  9.05263158,  8.42105263, 11.57894737,
 11.78947368, 16.63157895, 13.47368421, 17.89473684, 22.73684211,
 21.26315789, 23.57894737, 20.42105263, 26.10526316, 22.94736842]])
```

```
1 np.transpose(matrizAB).dot(matrizAB_norm)
```

```
array([[140.        , 111.05263158],
       [111.05263158, 140.        ]])
```

```
1
```