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## Assignment 03

In the list below, determine how many numbers are smaller than 0.5. Use do-loop and if-function:

```
ran = {0.115982, 0.915117, 0.27832, 0.190823, 0.440397, 0.076071, 0.733455,
0.0238866, 0.519024, 0.862353, 0.517789, 0.508546, 0.00592584, 0.63973,
0.087796, 0.914853, 0.852816, 0.50755, 0.019956, 0.0450688, 0.389318,
0.613672, 0.433074, 0.870317, 0.285534, 0.273034, 0.135192, 0.723829,
0.764315, 0.660089, 0.158247, 0.380149, 0.797884, 0.559137, 0.0662414,
0.205511, 0.757676, 0.228942, 0.643928, 0.514522, 0.559161, 0.628176,
0.0743335}
```

Construct a 5x5 matrix where each element is the sum of the indexes indicating its position in the row and in the column.

$$\begin{pmatrix} 2 & 3 & 4 & 5 & 6 \\ 3 & 4 & 5 & 6 & 7 \\ 4 & 5 & 6 & 7 & 8 \\ 5 & 6 & 7 & 8 & 9 \\ 6 & 7 & 8 & 9 & 10 \end{pmatrix}$$

Construct a 5x5 matrix that looks like:

$$\begin{pmatrix} 7 & 7 & 7 & 7 & 7 \\ 7 & 0 & 0 & 0 & 7 \\ 7 & 0 & 0 & 0 & 7 \\ 7 & 0 & 0 & 0 & 7 \\ 7 & 7 & 7 & 7 & 7 \end{pmatrix}$$

Construct a 5x5 matrix that looks like:

$$\begin{pmatrix} 1 & 0 & 0 & 0 & -1 \\ 0 & 1 & 0 & -1 & 0 \\ 0 & 0 & 10 & 0 & 0 \\ 0 & -1 & 0 & 1 & 0 \\ -1 & 0 & 0 & 0 & 1 \end{pmatrix}$$

Given the matrix and vector

`m1 = { {1, 2, 3}, {1, 1, 1}, {3, 2, 1} };`

`v1 = {6, 5, 4};`

Use do-loops to compute the vector `Vprod=m1.v1`

Show `Vprod` in `MatrixForm`

Compare the result from your little code with `m1.v1`

Given the matrices

`m1 = { {1, 2, 3}, {1, 1, 1}, {3, 2, 1} };`

`m2 = { {9, 8, 7}, {6, 5, 4}, {3, 2, 1} };`

Use do-loops to compute the matrix `mprod=m1.m2`

Show `mprod` in `MatrixForm`

Compare the result from your little code with `m1.m2`

Do `m1` and `m2` commute, that is, is `m1.m2` equal to `m2.m1`?

A projectile initially placed at `xo=0` and `yo=0` is launched with `vox=10` (pointing to the right) and `voy=7` (pointing up). The units are arbitrary.

Use this information to make three lists:

- 1) Time and vertical position `y`, starting at `time=0` with increments 0.05. Stop right before `y` becomes negative.
- 2) Time and horizontal position `x` for the same instants of time above.
- 3) Horizontal and vertical positions, as obtained in (1) and (2).

Export the data in three different files. They will be used in the next class.

Careful with the folder where you save your data!