Assignment 03

In the list below, determine how many numbers are smaller than 0.5. Use do-loop and if-function:
\[ \text{ran} = \{0.115982, 0.915117, 0.27832, 0.190823, 0.440397, 0.076071, 0.733455, 0.023866, 0.519024, 0.862353, 0.517789, 0.508546, 0.00592584, 0.087796, 0.914853, 0.852816, 0.50755, 0.019956, 0.450688, 0.389318, 0.613672, 0.433074, 0.870317, 0.285334, 0.273034, 0.135192, 0.723829, 0.764315, 0.660089, 0.158247, 0.380149, 0.797884, 0.559137, 0.0662414, 0.205511, 0.757676, 0.228942, 0.643928, 0.514522, 0.559161, 0.628176, 0.0743335 \} \]

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

\[
\begin{bmatrix}
2 & 3 & 4 & 5 & 6 \\
3 & 4 & 5 & 6 & 7 \\
4 & 5 & 6 & 7 & 8 \\
5 & 6 & 7 & 8 & 9 \\
6 & 7 & 8 & 9 & 10
\end{bmatrix}
\]

Construct a 5x5 matrix that looks like:

\[
\begin{bmatrix}
7 & 7 & 7 & 7 & 7 \\
7 & 0 & 0 & 0 & 7 \\
7 & 0 & 0 & 0 & 7 \\
7 & 0 & 0 & 0 & 7 \\
7 & 7 & 7 & 7 & 7
\end{bmatrix}
\]

Construct a 5x5 matrix that looks like:
Given the matrix and vector
\[
m_1 = \{ \{1, 2, 3\}, \{1, 1, 1\}, \{3, 2, 1\} \};
\]
\[
v_1 = \{6, 5, 4\};
\]
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
\[
m_1 = \{ \{1, 2, 3\}, \{1, 1, 1\}, \{3, 2, 1\} \};
\]
\[
m_2 = \{ \{9, 8, 7\}, \{6, 5, 4\}, \{3, 2, 1\} \};
\]
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!