MENG-201

1) Create a code that receives any random $m \times n$ matrix with its elements made of ones and zeros, and for the output prints the total number of consecutive instances of one and then zero counted using all the rows in the input: (assume at least one instance like such exists)

Example: $A = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 1 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix} \rightarrow count = 1 + 1 + 1 + 1 = 4$

Example: $A = \begin{bmatrix} 1 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 0 & 1 \\ 1 & 0 & 0 & 1 & 1 \\ 1 & 1 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \end{bmatrix} \rightarrow count = 1 + 1 + 1 + 1 + 1 + 1 + 1 = 7$

Note: Converting the input into a row matrix should be avoided, as there is a chance of over-counting for a zero, and a one from the prior row.

2) Create a code that receives any random **square** matrix, and for the output prints the sum of all the elements on the **secondary diagonal** of the input (The diagonal connecting the right top to bottom left corner)

Example:

$$A = \begin{bmatrix} 1 & 4 \\ 3 & -2 \end{bmatrix} \rightarrow B = 3 + 4 = 7$$

$$A = \begin{bmatrix} 0 & -2 & 1 \\ -7 & 1 & 8 \\ -4 & 2 & 3 \end{bmatrix} \rightarrow B = -4 + 1 + 1 = -2$$

3) The critical temperature for a machine is defined as 0^{oc}. If the recorded temperature goes below zero the machine will send a value of one to a pin associated with a warning light. Create a code that receives a row matrix, that is initially printing zero for the values above or equal to the critical level, and prints one as soon as just one recorded temperature value goes below zero (even if it returns back to normal temperatures).

Example:

$$A = [1\ \ 2\ \ 6\ \ 3\ \ 1\ \ 0\ \ -2\ \ -3\ \ 0\ \ 1\ \ 2\ \ 0\ \ -1\ \ 1]$$
$$\rightarrow B = [0\ \ 0\ \ 0\ \ 0\ \ 0\ \ 0\ \ 1\ \ 1\ \ 1\ \ 1\ \ 1\ \ 1\ \ 1\ \ 1]$$

$$A = [1\ \ 2\ \ 0\ \ -3\ \ -1\ \ 0\ \ 1\ \ 0]$$
$$\rightarrow B = [0\ \ 0\ \ 0\ \ 1\ \ 1\ \ 1\ \ 1\ \ 1]$$