Question 1

Let

$$A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}.$$

Express A^n for every positive integer n as a 2×2 matrix.

Question 2

- True or false: Every symmetric matrix can be expressed as a sum of two non-symmetric matrices.
- True or false: if the product of two matrices A, B is a zero matrix, then A or B is also a zero matrix.

Question 3

Let B be the transformation of the Euclidean plane which rotates every point by $\pi/2$ radians around the origin.

- Given an arbitrary point (x', y') in the plane, what are the coordinates of $B((x', y'))$?
- Represent B as a matrix.
- Give two conceptually different explanations as to why $B^4 = I$.

Question 4

Characterize all 2×2 matrices A which satisfy $A^2 = I$.