

# Matrices and how they can be used in quantum computing – Quiz

## Question 1

The order of a matrix with 3 rows and 4 columns is 7.

- A. True
- B. False

## Question 2

A square matrix is a matrix with equal numbers of rows and columns.

- A. True
- B. False

## Question 3

Which operation requires matrices to have the same dimensions?

- A. Multiplication
- B. Addition
- C. Transposition
- D. Kronecker product

## Question 4

In matrix multiplication, the number of columns in the first matrix must match the number of \_\_\_\_ in the second matrix.

- A. Rows
- B. Columns
- C. Elements
- D. Numbers

## Exercise 1: Addition, subtraction and multiplication of matrices

For the given matrices  $A$  and  $B$ , calculate  $A + B$ ,  $A - B$ ,  $AB$  and  $BA$ .

$$A = \begin{bmatrix} 4 & 1 \\ 2 & -1 \end{bmatrix} \text{ and } B = \begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}$$

## Exercise 2: Kronecker product

- A) Calculate the Kronecker product of the two vectors  $\vec{u} = \begin{bmatrix} 1 \\ 3 \end{bmatrix}$  and  $\vec{v} = \begin{bmatrix} 4 \\ 2 \end{bmatrix}$ .
- B) Find the **quantum states** of a two-qubit system composed of the two qubits in the states  $|0\rangle = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$  and  $|1\rangle = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$ .