

Multiplicación de matrices

Nº 1

$$U = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$$

$$U |0\rangle = \begin{pmatrix} a \\ c \end{pmatrix}$$

$$U |1\rangle = \begin{pmatrix} b \\ d \end{pmatrix}$$

Nº 2

$$U |0\rangle = \begin{pmatrix} e \\ f \end{pmatrix}$$

$$U |1\rangle = \begin{pmatrix} g \\ h \end{pmatrix}$$

$$U = \begin{pmatrix} e & g \\ f & h \end{pmatrix}$$

Nº 3

$$U = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$$

$$\lambda U |0\rangle = \lambda \begin{pmatrix} a \\ c \end{pmatrix} = \begin{pmatrix} \lambda a \\ \lambda c \end{pmatrix}$$

$$\lambda U |1\rangle = \begin{pmatrix} \lambda b \\ \lambda d \end{pmatrix}$$

$$\lambda U = \begin{pmatrix} \lambda a & \lambda b \\ \lambda c & \lambda d \end{pmatrix}$$

Nº 4

$$U(\alpha |0\rangle + \beta |1\rangle) = \alpha U |0\rangle + \beta U |1\rangle$$

$$U \begin{pmatrix} \alpha \\ \beta \end{pmatrix} = ?$$

Nº 5

$$A = \begin{pmatrix} a_0 & b_0 \\ a_1 & b_1 \end{pmatrix} \quad B = \begin{pmatrix} c_0 & d_0 \\ c_1 & d_1 \end{pmatrix}$$

$$B |0\rangle = \begin{pmatrix} c_0 \\ c_1 \end{pmatrix}$$

$$B |1\rangle = \begin{pmatrix} d_0 \\ d_1 \end{pmatrix}$$

$$AB |0\rangle = \begin{pmatrix} a_0 c_0 + b_0 c_1 \\ a_1 c_0 + b_1 c_1 \end{pmatrix}$$

$$AB |1\rangle = \begin{pmatrix} a_0 d_0 + b_0 d_1 \\ a_1 d_0 + b_1 d_1 \end{pmatrix}$$

$$AB = \begin{pmatrix} a_0 c_0 + b_0 c_1 & a_0 d_0 + b_0 d_1 \\ a_1 c_0 + b_1 c_1 & a_1 d_0 + b_1 d_1 \end{pmatrix}$$

Nº 6

$$I |0\rangle = |0\rangle = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$I |1\rangle = |1\rangle$$

$$I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$$

$$I \begin{pmatrix} \alpha \\ \beta \end{pmatrix} = \begin{pmatrix} \alpha \\ \beta \end{pmatrix}$$

Nº 7

$$NOT\,|0\rangle = X\,|0\rangle = |1\rangle$$

$$X\,|1\rangle = |0\rangle$$

$$X = \left(\begin{array}{cc} 0 & 1 \\ 1 & 0 \end{array}\right)$$

$$X\left(\begin{array}{c} \alpha \\ \beta \end{array}\right) = \left(\begin{array}{c} \beta \\ \alpha \end{array}\right)$$

$$XX = I$$