

Which of the following acronyms is helpful when expressing two independent qubits as a 2-qubit combination?

a. WTR
b. FOIL
c. FFT
d. LOL

Convert the two independent qubits shown below into 2-qubit bra-ket notation.

QUBIT 1

$$\frac{1}{\sqrt{2}}|0\rangle + \frac{1}{\sqrt{2}}|1\rangle$$

QUBIT 2

$$0|0\rangle + 1|1\rangle$$

$a.$ $0|00\rangle + \frac{1}{\sqrt{2}}|01\rangle + \frac{1}{\sqrt{2}}|10\rangle + 0|11\rangle$

$b.$ $1|00\rangle + \frac{1}{\sqrt{2}}|01\rangle + 1|10\rangle + \frac{1}{\sqrt{2}}|11\rangle$

$c.$ $\frac{1}{\sqrt{2}}|01\rangle + \frac{1}{\sqrt{2}}|11\rangle$

$d.$ $1|00\rangle + \frac{1}{\sqrt{2}}|01\rangle + \frac{1}{\sqrt{2}}|10\rangle + 1|11\rangle$

Convert the two independent qubits shown below into 2-qubit bra-ket notation.

QUBIT 1	QUBIT 2
$\frac{1}{2}\vert 0\rangle + \frac{\sqrt{3}}{2}\vert 1\rangle$	$1\vert 0\rangle + 0\vert 1\rangle$

$a.\ \frac{1}{\sqrt{2}}|00\rangle + 0\ |01\rangle + \frac{\sqrt{3}}{2}|10\rangle + 1|11\rangle$

$b.\ \frac{1}{2}\ |00\rangle + \frac{\sqrt{3}}{2}|01\rangle + 0\ |10\rangle + 0|11\rangle$

$c.\ \frac{\sqrt{3}}{2}|00\rangle + 0\ |01\rangle + \frac{1}{2}\ |10\rangle + 0|11\rangle$

$d.\ \frac{1}{2}\ |00\rangle + 0\ |01\rangle + \frac{\sqrt{3}}{2}|10\rangle + 0|11\rangle$

Convert the 2-qubit bra-ket notation into vector notation.

BRA-KET NOTATION

$$\frac{1}{2}|00\rangle + \frac{\sqrt{3}}{2}|01\rangle + 0\,|10\rangle + 0|11\rangle$$

$a.$ $\begin{bmatrix} \frac{1}{2} \\ \frac{\sqrt{3}}{2} \\ 0 \\ 0 \end{bmatrix}$

$b.$ $\frac{1}{2}\begin{bmatrix} 1 \\ \frac{\sqrt{3}}{2} \\ 0 \\ 0 \end{bmatrix}$

$c.$ $\begin{bmatrix} 0 \\ \frac{\sqrt{3}}{2} \\ \frac{1}{2} \\ 0 \end{bmatrix}$

$d.$ $\frac{\sqrt{3}}{2}\begin{bmatrix} 1 \\ 1 \\ 0 \\ 0 \end{bmatrix}$

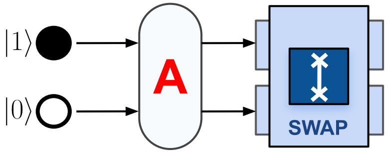
Convert the 2-qubit bra-ket notation into vector notation.

BRA-KET NOTATION

$$0|00\rangle + \frac{1}{\sqrt{2}}|01\rangle + \frac{1}{\sqrt{2}}|10\rangle + 0|11\rangle$$

$a.\ \begin{bmatrix} \frac{1}{\sqrt{2}} \\ 0 \\ 0 \\ \frac{1}{\sqrt{2}} \end{bmatrix}$ $b.\ \begin{bmatrix} \frac{1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} \end{bmatrix}$ $c.\ \frac{1}{\sqrt{2}}\begin{bmatrix} 0 \\ 1 \\ 1 \\ 0 \end{bmatrix}$ $d.\ \frac{1}{\sqrt{2}}\begin{bmatrix} 1 \\ 1 \\ 0 \\ 0 \end{bmatrix}$

Select the option below that describes the combined 2-qubit state at **A**.



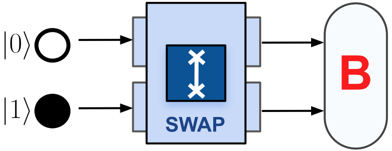
$a.\ \ 1|00\rangle + 0|01\rangle + 1|10\rangle + 0|11\rangle$

$b.\ \ 0|00\rangle + 1|01\rangle + 1|10\rangle + 0|11\rangle$

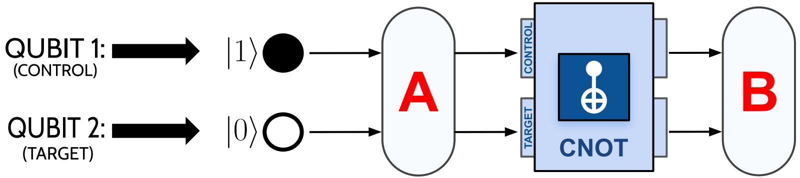
$c.\ \ 0|00\rangle + 0|01\rangle + 0|10\rangle + 1|11\rangle$

$d.\ \ 0|00\rangle + 0|01\rangle + 1|10\rangle + 0|11\rangle$

Select the option below that describes the combined 2-qubit state at **B**.

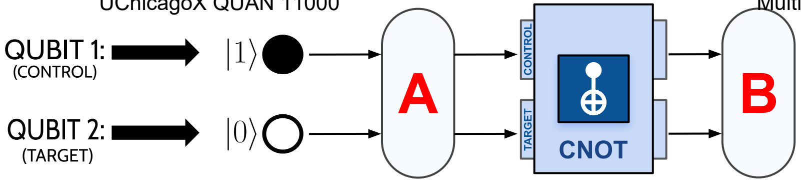


$a.\ \begin{bmatrix}1\\0\\0\\0\end{bmatrix}$ $b.\ \begin{bmatrix}0\\1\\0\\0\end{bmatrix}$ $c.\ \begin{bmatrix}0\\0\\1\\0\end{bmatrix}$ $d.\ \begin{bmatrix}0\\0\\0\\1\end{bmatrix}$



Select the option that describes the combined 2-qubit state at **A**.

$a.\ \begin{bmatrix}1\\0\\0\\0\end{bmatrix}$ $b.\ \begin{bmatrix}0\\1\\0\\0\end{bmatrix}$ $c.\ \begin{bmatrix}0\\0\\1\\0\end{bmatrix}$ $d.\ \begin{bmatrix}0\\0\\0\\1\end{bmatrix}$



Select the option that describes the combined 2-qubit state at **B**.

$a.\ \ 1|00\rangle + 0|01\rangle + 1|10\rangle + 0|11\rangle$

$b.\ \ 0|00\rangle + 1|01\rangle + 0|10\rangle + 0|11\rangle$

$c.\ \ 0|00\rangle + 0|01\rangle + 1|10\rangle + 0|11\rangle$

$d.\ \ 0|00\rangle + 0|01\rangle + 0|10\rangle + 1|11\rangle$