

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

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

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

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

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

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

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

BRA-KET NOTATION

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

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

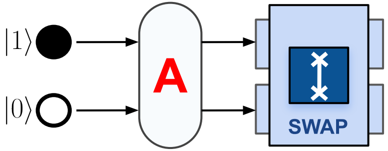
Convert the 2-qubit bra-ket notation into vector notation.

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**.



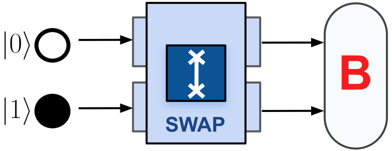
a. $1\,|00\rangle + 0\,|01\rangle + 1\,|10\rangle + 0\,|11\rangle$

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

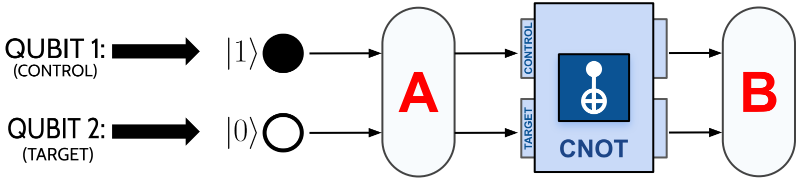
c. $0\,|00\rangle + 0\,|01\rangle + 0\,|10\rangle + 1\,|11\rangle$

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**.

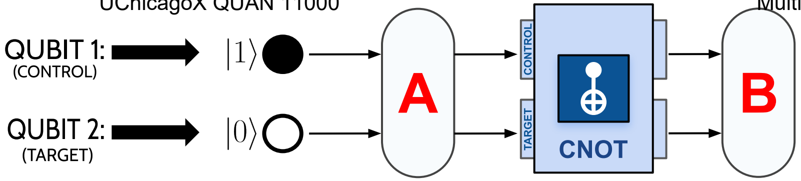


$a.\ \begin{bmatrix} 1 \\ 0 \\ 0 \\ 0 \end{bmatrix}$ $\quad b.\ \begin{bmatrix} 0 \\ 1 \\ 0 \\ 0 \end{bmatrix}$ $\quad c.\ \begin{bmatrix} 0 \\ 0 \\ 1 \\ 0 \end{bmatrix}$ $\quad d.\ \begin{bmatrix} 0 \\ 0 \\ 0 \\ 1 \end{bmatrix}$



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**.

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

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

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

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