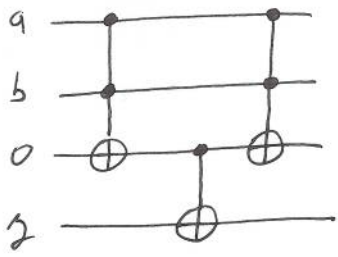


4) Uncomputing

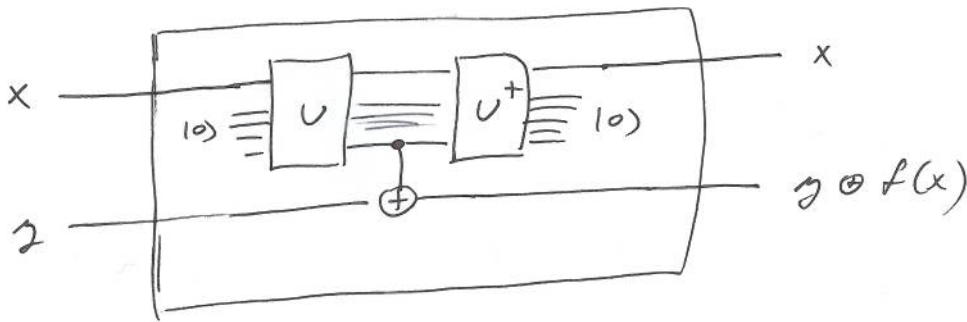


(a circuit designed just to demonstrate uncomputing, nothing else)

$$\begin{aligned}
 a) \quad |a, b, 0, 2\rangle &\rightarrow |a, b, 0 \oplus ab, 2\rangle \\
 &\rightarrow |a, b, ab, ab \oplus 2\rangle \\
 &\rightarrow |a, b, ab \oplus ab, 2 \oplus ab\rangle = |a, b, 0, 2 \oplus ab\rangle
 \end{aligned}$$

b) Third (ancillary) qubit unentangled.

That is the point of uncomputing



$$c) \quad \frac{1}{\sqrt{2}} (|100\rangle + |11\rangle) \otimes |10\rangle \otimes |10\rangle \xrightarrow{U} \frac{1}{\sqrt{2}} (|10000\rangle + |1100\rangle)$$

$$\rightarrow \frac{1}{\sqrt{2}} (|10000\rangle + |11001\rangle)$$

the third qubit is unentangled with the others