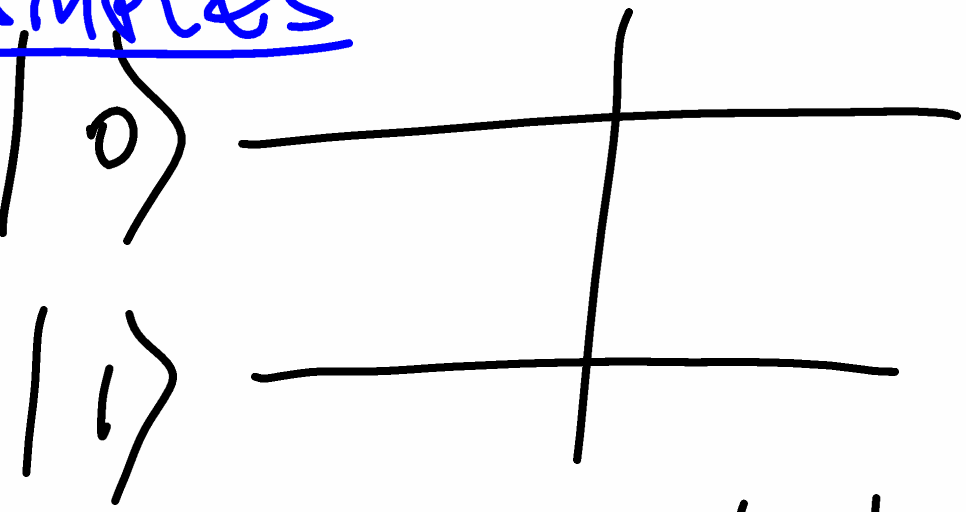
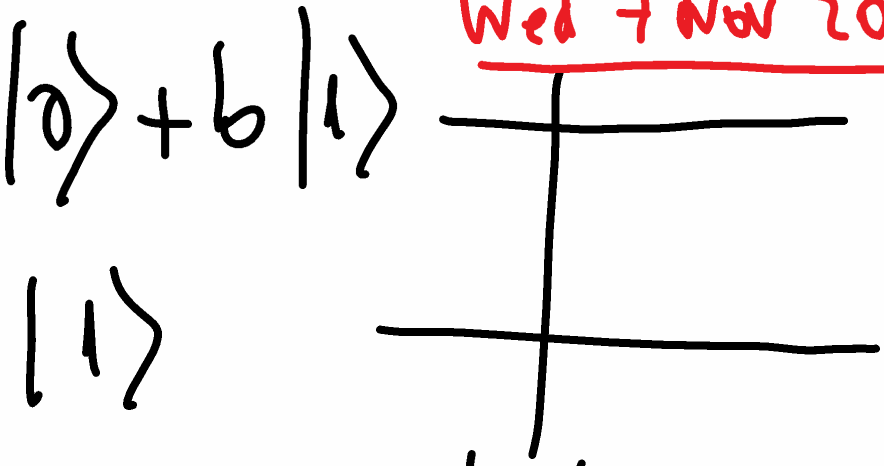
EXAMPLES

Wed 7 Nov 2018

(A) 

(B) 

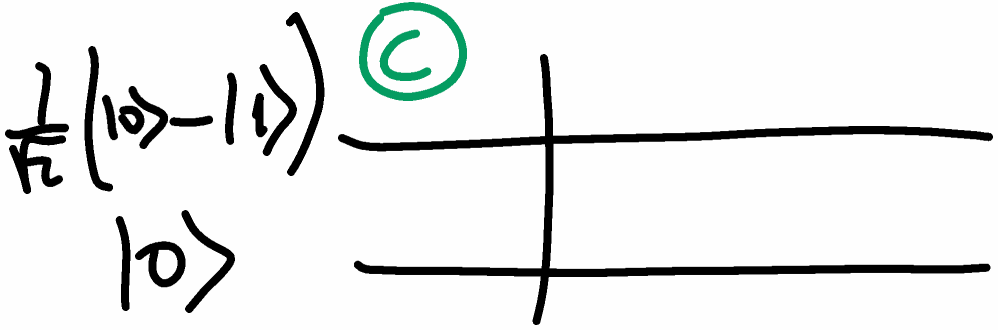
(A) $|S_1\rangle = |1\rangle|0\rangle = |10\rangle$ → Indep. or Entangled?

Indep

(B) $|S_2\rangle = |1\rangle\left(a|0\rangle + b|1\rangle\right) = a|1\rangle|0\rangle + b|1\rangle|1\rangle =$

$= a|10\rangle + b|11\rangle$

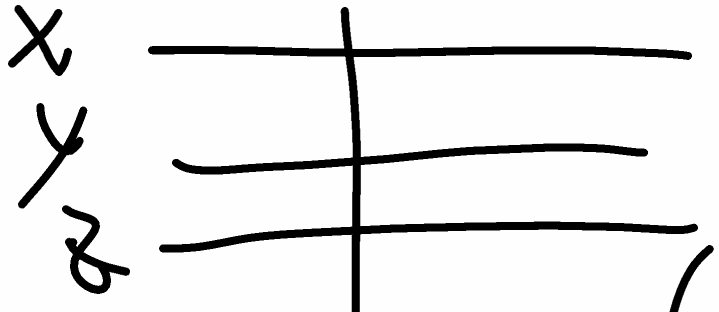
Independent



$$|S_1\rangle = |0\rangle \frac{1}{\sqrt{2}}(|0\rangle - |1\rangle) = \frac{1}{\sqrt{2}}(|00\rangle - |01\rangle)$$

Independent

D

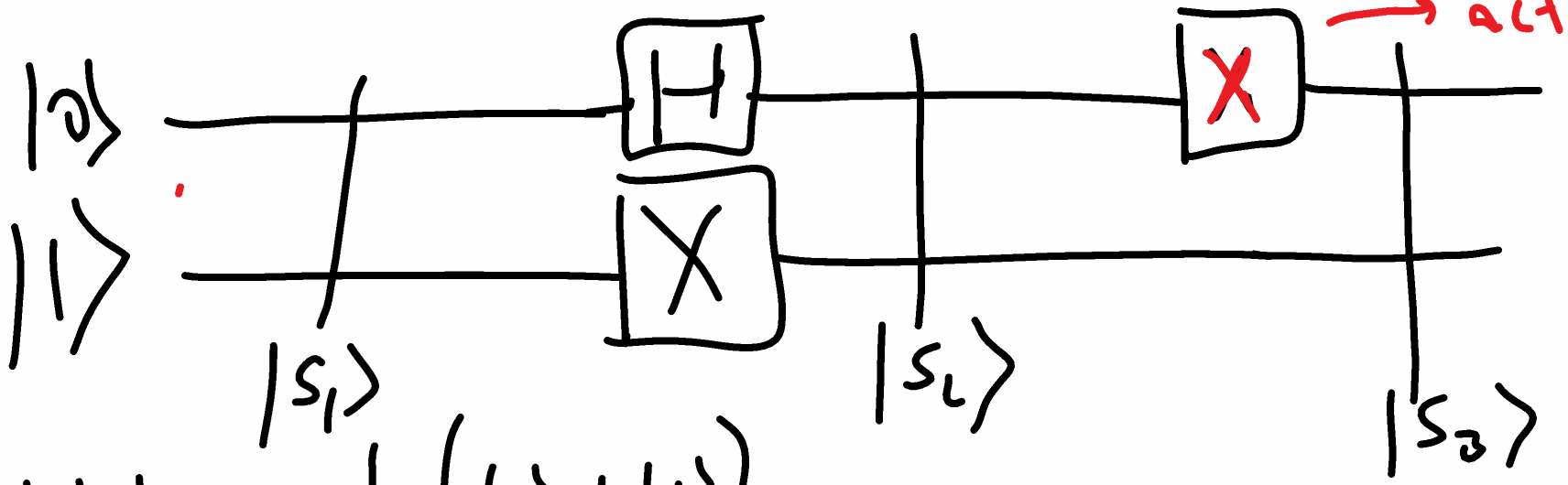


$$|S\rangle = \frac{1}{\sqrt{3}}(|010\rangle - |011\rangle + |000\rangle) = \frac{|0\rangle}{\sqrt{3}}\left[|1\rangle(|0\rangle - |1\rangle) + |00\rangle\right]$$

Independent

Entangled

(E)



$$H|0\rangle = \frac{1}{\sqrt{2}}\left(|0\rangle + |1\rangle\right)$$

$$|s_1\rangle = |10\rangle$$

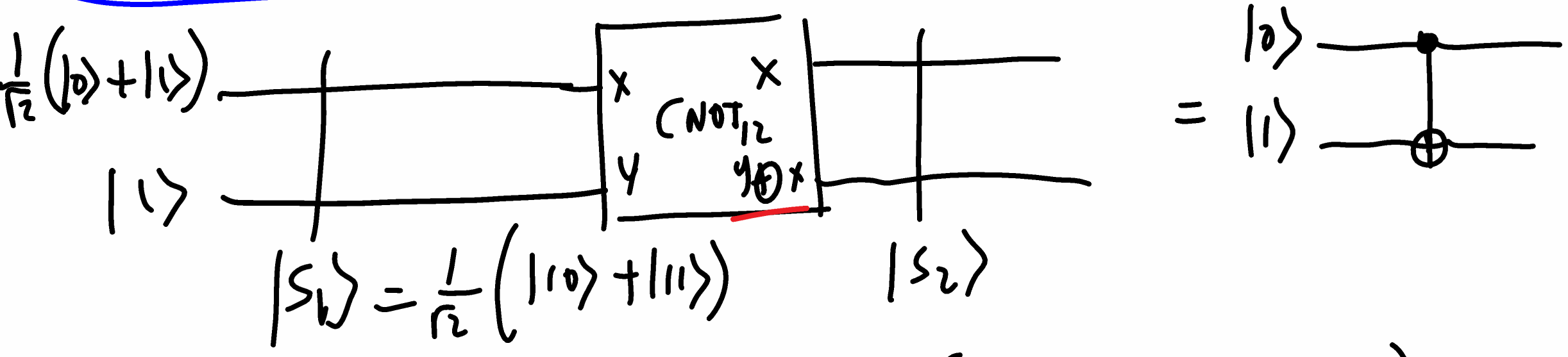
$$X|1\rangle = |0\rangle$$

$$|s_2\rangle = \frac{1}{\sqrt{2}}\left(|00\rangle + |01\rangle\right)$$

$$|s_3\rangle = \underset{\text{on top qubit}}{X}|s_2\rangle = \frac{1}{\sqrt{2}}\left(|0\rangle X|0\rangle + |0\rangle X|1\rangle\right) = \frac{1}{\sqrt{2}}\left(|01\rangle + |00\rangle\right)$$

Indep Qubits

(F) Q CIRCUIT THAT CREATES ENTANGLEMENT



$$|s_2\rangle = CNOT_{12}\,|s_1\rangle = \frac{1}{\sqrt{2}}\left(CNOT_{12}|10\rangle + CNOT_{12}|11\rangle\right) =$$

$$= \frac{1}{\sqrt{2}}\left(|10\rangle + |01\rangle\right)$$

Entangled!!