Saathi

Date ___ /___ /______

Challenge - 3

Bell states-

Maximally entangled states on 2 qubits

$$|\psi^{\pm}\rangle = (|00\rangle \pm |11\rangle)/\sqrt{2}$$

$$|\phi^{\pm}\rangle = (|01\rangle \pm |10\rangle)/\sqrt{2}$$

ENTANGLEMENT

→ let there be 2 qubits

→ we know measuring both of them separately can result in either $|0\rangle$ or $|1\rangle$

→ But if 2 qubits are entangled, determining either bit by measurement exactly determines the other without even measuring

let qubits be A and B

① $$|\psi^+\rangle \; \frac{|0\rangle_A \otimes |0\rangle_B + |1\rangle_A \otimes |1\rangle_B}{\sqrt{2}} = \frac{|00\rangle + |11\rangle}{\sqrt{2}}$$

② $$|\psi^-\rangle = \frac{|0\rangle_A \otimes |0\rangle_B - |1\rangle_A \otimes |1\rangle_B}{\sqrt{2}} = \frac{|00\rangle - |11\rangle}{\sqrt{2}}$$

③ $$|\phi^+\rangle = \frac{|0\rangle_A \otimes |1\rangle_B + |1\rangle_A \otimes |0\rangle_B}{\sqrt{2}} = \frac{|01\rangle + |10\rangle}{\sqrt{2}}$$

④ $$\frac{|0\rangle_A \otimes |1\rangle_B - |1\rangle_A \otimes |0\rangle_B}{\sqrt{2}} = \frac{|01\rangle - |10\rangle}{\sqrt{2}}$$