Multiple Qubit Quantum States

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Problem 1

▷ $\frac{1}{\sqrt{2}}|0\rangle \otimes |1\rangle - \frac{1}{\sqrt{2}}|1\rangle \otimes |1\rangle$
▷ $\frac{1}{\sqrt{2}}|01\rangle - \frac{1}{\sqrt{2}}|11\rangle$

Problem 2

Answer: The superposition collapses to one of the pure states $|00\rangle$, $|01\rangle$, $|10\rangle$ with equal probability $\frac{1}{3}$.

Problem 3

Answer: After measurement, the first qubit will be in state $|0\rangle$ whereas the second qubit will be in the state $\frac{1}{\sqrt{2}}(|0\rangle + |1\rangle)$.

Problem 4

Answer: After measurement, the first qubit will be in state $|1\rangle$ whereas the second qubit will be in the state $|0\rangle$.

Problem 5

▷ $\frac{1}{\sqrt{2}}(|00\rangle + |11\rangle)$
▷ $\frac{1}{\sqrt{2}}(|000\rangle + |111\rangle)$
▷ $\frac{1}{\sqrt{3}}(|00\rangle + |01\rangle + |11\rangle)$