1.3 Representing a Qubit on the Bloch Sphere

1. Draw Out a Bloch Sphere and plot the following qubit states

(a) $|0\rangle$ (b) $|1\rangle$ (c) $\frac{1}{\sqrt{2}}|0\rangle + \frac{1}{\sqrt{2}}|1\rangle$

2. On the Bloch Sphere, if a qubit is higher up vertically, what does that mean?

3. On the Bloch Sphere, if a qubit is lower down vertically, what does that mean?

Answers

1.

(a) $|0\rangle$ lies straight up on the north pole

(b) $|1\rangle$ lies straight down on the south pole

(c) $\frac{1}{\sqrt{2}}|0\rangle + \frac{1}{\sqrt{2}}|1\rangle$ has an even chance of being measured as 0 and 1, so it lies on the equator

2. The qubit has a higher probability of measuring 0 when measured

3. The qubit has a higher probability of measuring 1 when measured