

Quiz - Complex numbers II Results for Prateek Jain

❗ Correct answers are hidden.

Score for this attempt: **18** out of 20

Submitted May 20 at 4pm

This attempt took 3 minutes.

Question 1

2 / 2 pts

Which states are equivalent to the state $|\psi\rangle = \cos\frac{\pi}{3}|0\rangle + e^{i\pi}\sin\frac{\pi}{3}|1\rangle$ from the physical point of view (i.e., are equal up to a global phase)?

☒ $-\cos\frac{\pi}{3}|0\rangle - e^{i\pi}\sin\frac{\pi}{3}|1\rangle$

☐ $\cos\frac{\pi}{3}|0\rangle + e^{i\frac{\pi}{2}}\sin\frac{\pi}{3}|1\rangle$

☒ $e^{i\frac{\pi}{2}}\cos\frac{\pi}{3}|0\rangle + e^{i\frac{3\pi}{2}}\sin\frac{\pi}{3}|1\rangle$

☐ $\cos\frac{\pi}{6}|0\rangle + e^{i\pi}\sin\frac{\pi}{6}|1\rangle$

Question 2

2 / 2 pts

What is the probability to observe state $|0\rangle$ when we measure the following quantum state: $|\psi\rangle = \cos\frac{\pi}{4}|0\rangle + e^{i\pi}\sin\frac{\pi}{4}|1\rangle$

0.5

Question 3

2 / 2 pts

Which of the states corresponds to the following state:

$$|\psi\rangle = \cos\frac{\pi}{4}|0\rangle + e^{i\pi}\sin\frac{\pi}{4}|1\rangle ?$$



☐ $|1\rangle$

☐ $\frac{1}{\sqrt{2}}|0\rangle + \frac{1}{\sqrt{2}}|1\rangle$

☐ $|0\rangle$

☒ $\frac{1}{\sqrt{2}}|0\rangle - \frac{1}{\sqrt{2}}|1\rangle$

☐ $\frac{1}{\sqrt{2}}|0\rangle + \frac{1}{\sqrt{2}}i|1\rangle$

Question 4

2 / 2 pts

Which of the states corresponds to the following state: $|\psi\rangle = \frac{\sqrt{3}}{2}|0\rangle - \frac{i}{2}|1\rangle$?

☐ $\cos\frac{\pi}{3}|0\rangle + e^{i\frac{3\pi}{2}}\sin\frac{\pi}{3}|1\rangle$

☐ $\cos\frac{\pi}{3}|0\rangle + e^{i\frac{\pi}{2}}\sin\frac{\pi}{3}|1\rangle$

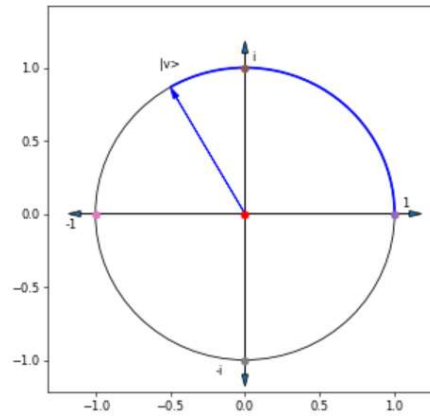
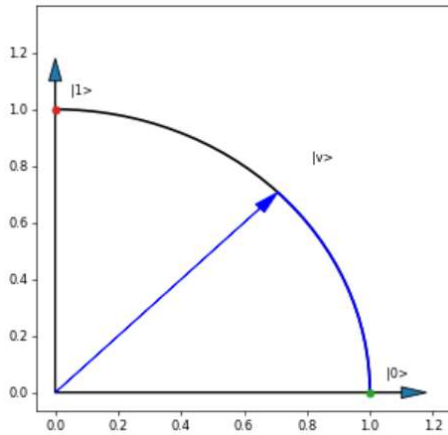
☐ $\cos\frac{\pi}{6}|0\rangle + e^{i\frac{\pi}{2}}\sin\frac{\pi}{6}|1\rangle$

☒ $\cos\frac{\pi}{6}|0\rangle + e^{i\frac{3\pi}{2}}\sin\frac{\pi}{6}|1\rangle$

Question 5

2 / 2 pts

Which of the states is demonstrated on the following images:



?

☐ $|\psi\rangle = \cos\frac{\pi}{8}|0\rangle + e^{i\frac{\pi}{3}}\sin\frac{\pi}{8}|1\rangle$

☐ $|\psi\rangle = \cos\frac{\pi}{2}|0\rangle + e^{i\frac{3\pi}{4}}\sin\frac{\pi}{2}|2\rangle$

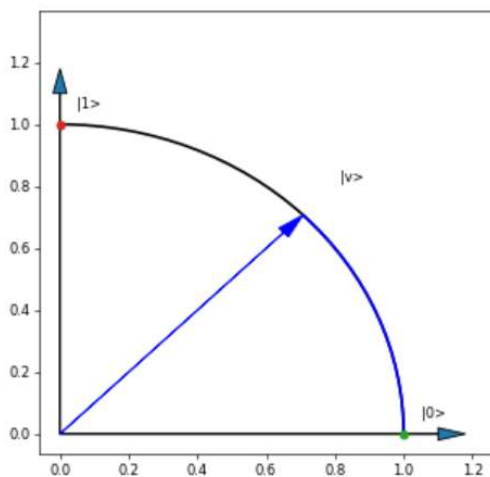
☒ $|\psi\rangle = \cos\frac{\pi}{4}|0\rangle + e^{i\frac{2\pi}{3}}\sin\frac{\pi}{4}|1\rangle$

☐ $|\psi\rangle = \cos\frac{\pi}{4}|0\rangle + e^{i\frac{\pi}{3}}\sin\frac{\pi}{4}|1\rangle$

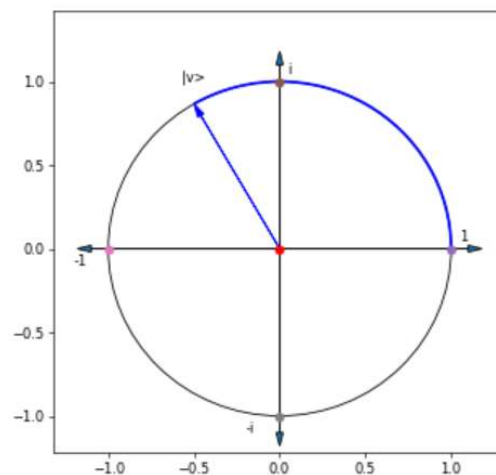
Question 6

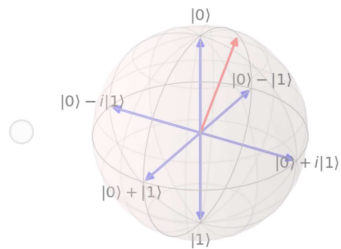
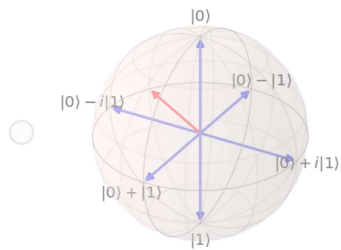
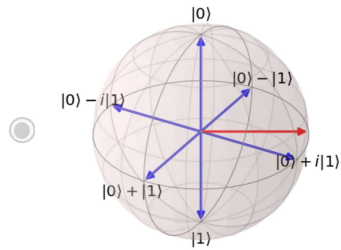
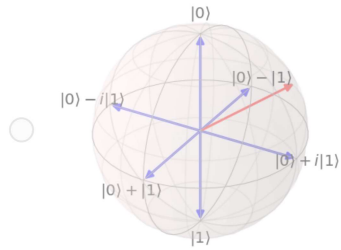
2 / 2 pts

Which state on the Bloch sphere corresponds to this state:



?

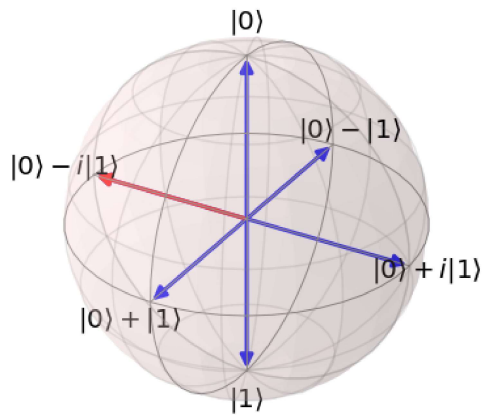




Question 7

2 / 2 pts

Which state is depicted on the following Bloch sphere?



- ☐ $|\psi\rangle = \cos\frac{\pi}{8}|0\rangle + e^{i\frac{\pi}{3}}\sin\frac{\pi}{8}|1\rangle$
- ☐ $|\psi\rangle = \cos\frac{\pi}{2}|0\rangle + e^{i\frac{2\pi}{3}}\sin\frac{\pi}{2}|1\rangle$
- ☐ $|\psi\rangle = \cos\frac{\pi}{4}|0\rangle + e^{i\frac{2\pi}{3}}\sin\frac{\pi}{4}|1\rangle$
- ☒ $|\psi\rangle = \cos\frac{\pi}{4}|0\rangle + e^{i\frac{3\pi}{2}}\sin\frac{\pi}{4}|1\rangle$

Question 8

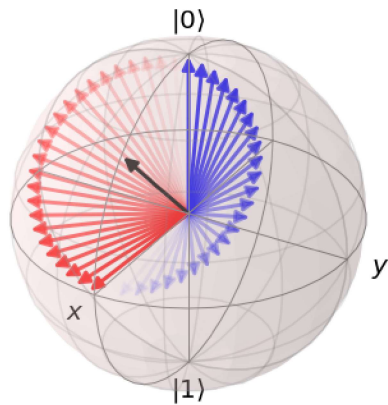
2 / 2 pts

Gates X, Y and Z perform rotations on a Bloch sphere around x-, y- and z-axis, respectively. By which angle are these rotations performed?

- ☒ π
- ☐ $\frac{\pi}{2}$
- ☐ 2π
- ☐ $\frac{3\pi}{2}$

Question 9

2 / 2 pts



Here is the rotation axis of Hadamard

operator. Which state will not change after applying Hadamard operator?

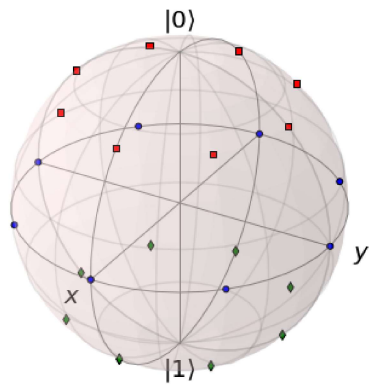
- ☐ $\frac{\sqrt{3}}{2}|0\rangle + \frac{1}{2}|1\rangle$
- ☐ $\frac{1}{\sqrt{2}}|0\rangle + \frac{1}{\sqrt{2}}|1\rangle$
- ☒ $\cos\frac{\pi}{8}|0\rangle + \sin\frac{\pi}{8}|1\rangle$
- ☐ $\cos\frac{\pi}{4}|0\rangle + \sin\frac{\pi}{4}|1\rangle$

Incorrect

Question 10

0 / 2 pts

Suppose that we begin from the state $|1\rangle$. Mark the set(s) of gates on the list below that allow us to reach all the states depicted on the following Bloch sphere

☒ T,Z☐ H,T☐ RZ,H☐ H,Z☐ S,Y☐ Z,XQuiz Score: **18** out of 20