Quiz - Complex Numbers I Results for Prateek Jain

Correct answers are hidden.

Score for this attempt: **16** out of 20
Submitted May 20 at 3:19pm
This attempt took 2 minutes.

Question 1

2 / 2 pts

Given quantum state $|\psi\rangle = \frac{-2i}{\sqrt{6}}|01\rangle + \frac{1}{\sqrt{6}}(1-i)|11\rangle$, compute $|\langle\phi|\psi\rangle|^2$ where $|\phi\rangle = |11\rangle$. Write your answer as a fraction in reduced form without any spaces. (Ex: 1/2)

1/3

Question 2

2 / 2 pts

Given that $|\psi\rangle = -(2+i)|00\rangle + (1-i)|01\rangle + \frac{1-i}{3}|11\rangle$, what is $\langle\psi|$?

- $-(2+i)\langle 00| + (1-i)\langle 01| + \frac{1-i}{3}\langle 11|$
- $(2+i)\langle 00| + (1+i)\langle 01| + \frac{1+i}{3}\langle 11|$
- **$-(2-i)\langle 00| + (1+i)\langle 01| + \frac{1+i}{3}\langle 11|$**
- $(2+i)\langle 00| - (1+i)\langle 01| - \frac{1+i}{3}\langle 11|$

Question 3

2 / 2 pts

What is the resulting state if ***Y*** operator is applied to the state $\begin{pmatrix} \frac{i}{\sqrt{6}} \\ \frac{2+i}{\sqrt{6}} \end{pmatrix}$?

- $\begin{pmatrix} \frac{2+i}{\sqrt{6}} \\ \frac{1}{\sqrt{6}} \end{pmatrix}$
- $\begin{pmatrix} \frac{1}{\sqrt{6}} \\ \frac{2i-1}{\sqrt{6}} \end{pmatrix}$
- $\begin{pmatrix} \frac{-1}{\sqrt{6}} \\ \frac{2i-1}{\sqrt{6}} \end{pmatrix}$
- $\begin{pmatrix} \frac{1-2i}{\sqrt{6}} \\ \frac{-1}{\sqrt{6}} \end{pmatrix}$

Question 4

2 / 2 pts

Select the unitary matrices.

- $\begin{pmatrix} \frac{1}{2} & \frac{1-i}{2} \\ \frac{1-i}{2} & \frac{1}{2} \end{pmatrix}$
- $\begin{pmatrix} 1 & 0 \\ 0 & e^{\pi i/4} \end{pmatrix}$
- $\begin{pmatrix} \frac{1}{\sqrt{2}} & 0 \\ \frac{1}{\sqrt{2}} & e^{\pi i/4} \end{pmatrix}$
- $\begin{pmatrix} \frac{1}{\sqrt{2}} & -\frac{i}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} & \frac{i}{\sqrt{2}} \end{pmatrix}$
- $\begin{pmatrix} e^{-\pi i/3} & 0 \\ 0 & e^{\pi i/3} \end{pmatrix}$

Unanswered

Question 5

0 / 2 pts

```
from qiskit import QuantumRegister, ClassicalRegister, QuantumCircuit, execute, Aer

mycircuit = QuantumCircuit(2,2)

# Your code here
```

What should replace "your code here" so that the resulting quantum state is $i|10\rangle$?

Incorrect

Question 6

0 / 2 pts

```
from qiskit import QuantumRegister, ClassicalRegister, QuantumCircuit, execute, Aer

mycircuit = QuantumCircuit(1,1)

mycircuit._(0)

mycircuit._(0)

mycircuit._(0)
```

Fill the blanks so that the after applying the operations the resulting quantum state is $\frac{1}{\sqrt{2}}|0\rangle - i\frac{1}{\sqrt{2}}|1\rangle$.

Write your answer in the following format

h, s, t

sht

Question 7

2 / 2 pts

Suppose we have a single qubit. When applied to an initial state $|0\rangle$, which of the following gate sequence(s) yield the output state $|0\rangle$?"

- [x] H.S.S.S.S.H
- [ ] H.S.H
- [x] T
- [ ] H.TDG.H
- [x] H.S.SDG.H
- [x] S

Question 8

1 / 1 pts

What is |3+4i| ?

- ( ) -1
- (•) 5
- ( ) 7
- ( ) 25

Question 9

1 / 1 pts

What is $2 \cdot e^{i\pi/3}$ in rectangular form?

- (selected) $1 + \sqrt{3}i$
- $2\sqrt{3} + 2i$
- $\sqrt{2} + 2i$
- $\sqrt{3} - i$

Question 10

1 / 1 pts

How do you compute and print the conjugate of the number z=2+3i in Python?

- `z=2+3i`
  `print(conjugate(z))`
- (selected)
  ```
  z=2+3j
  print(z.conjugate())
  ```
- `z=2+3j`
  `print(conjugate(z))`

Question 11

1 / 1 pts

How do you compute polar form of 2-3i in Python?

- ```
  r = abs(2-3j)
  alpha = asin(-3/r)
  ```

- ```
  r = abs(2-3i)
  alpha = asin(-3/r)
  ```

- ```
  r = abs(2-3j)
  alpha = sin(-3/r)
  ```

- ```
  r=-3
  alpha = asin(2/r)
  ```

Question 12

1 / 1 pts

Given the quantum state $\begin{pmatrix} \frac{2-i}{3} \\ \frac{\sqrt{3}+i}{3} \end{pmatrix}$, what is the probability of observing $|0\rangle$?

- 1/3
- 1/9
- 2/9
- 5/9

Question 13

1 / 1 pts

Given that $\left(\frac{a}{\frac{1-i}{2}}\right)$ is a valid quantum state, select the possible values for a?

- [ ] 1/2
- [x] -i/√2
- [ ] (i+1)/4
- [x] (i-1)/2
- [ ] i/2

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