

Quiz - Introduction to Complex Numbers I

Due Jun 9 at 11:59pm**Points** 20**Questions** 11**Available** until Jun 9 at 11:59pm**Time Limit** None**Allowed Attempts** Unlimited[Take the Quiz Again](#)

Attempt History

| | Attempt | Time | Score |
|--------|---------------------------|------------|-----------------|
| KEPT | Attempt 3 | 3 minutes | 18 out of 20 |
| LATEST | Attempt 3 | 3 minutes | 18 out of 20 |
| | Attempt 2 | 14 minutes | 16.67 out of 20 |
| | Attempt 1 | 6 minutes | 12.83 out of 20 |

❗ Correct answers are hidden.

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

Submitted Jun 9 at 2:06am

This attempt took 3 minutes.

Question 1

2 / 2 pts

[C01-01] What is $|3i + 4|$?

☐ 25☐ 7☒ 5☐ -1

Question 2

2 / 2 pts

[C01-02] What is $a + b$ if $a = 3 + 2i$ and $b = -i$?

☐ $3-3i$ ☐ $3-i$ ☐ 3 ☒ $3+i$ **Question 3****2 / 2 pts****[C01-03]** What is $2 \cdot e^{i\pi/3}$ in rectangular form?☐ $2\sqrt{3} + 2i$ ☐ $\sqrt{2} + 2i$ ☐ $\sqrt{3} - i$ ☒ $1 + \sqrt{3}i$ **Question 4****2 / 2 pts****[C01-04]** How do you compute and print the conjugate of the number $z = 2 + 3i$ in Python?☒

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

☐

```
z=2+3i
print(conjugate(z))
```

☐

```
z=2+3j
print(conjugate(z))
```

Question 5

2 / 2 pts

[C01-05] How do you compute polar form of $2 - 3i$ in Python?



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



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



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



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

Incorrect

Question 6

0 / 2 pts

[C02a-01] 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)

Question 7

2 / 2 pts

[C02a-02] Given that $|\psi\rangle = -(2+i)|00\rangle + (1-i)|01\rangle + \frac{1-i}{3}|11\rangle$, what is $\langle\psi|$?



```
(2 + i)⟨00| + (1 + i)⟨01| +  $\frac{1+i}{3}$ ⟨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 8

1 / 1 pts

[C02b-01] Given the quantum state $\begin{pmatrix} \frac{2-i}{3} \\ \frac{\sqrt{3}+i}{3} \end{pmatrix}$, what is the probability of observing $|0\rangle$?

☐ 1/9

☒ 5/9

☐ 1/3

☐ 2/9

Question 9

1 / 1 pts

[C02b-02] Given that $\begin{pmatrix} a \\ \frac{1-i}{2} \end{pmatrix}$ is a valid quantum state, select the possible values for a .

☒ $(i-1)/2$

☐ $(i+1)/4$

☐ 1/2

☐ $i/2$

☒ $-i/\sqrt{2}$

Question 10

2 / 2 pts

[C03-01] What is the resulting state if Y operator is applied to the state

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



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

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

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

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

Question 11

2 / 2 pts

[C03-02] Select the unitary matrices.

☒ $\begin{pmatrix} e^{-\pi i/3} & 0 \\ 0 & e^{\pi i/3} \end{pmatrix}$

☒ $\begin{pmatrix} 1 & 0 \\ 0 & e^{\pi i/4} \end{pmatrix}$

☒ $\begin{pmatrix} \frac{1}{\sqrt{2}} & -\frac{i}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} & \frac{i}{\sqrt{2}} \end{pmatrix}$

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

☐ $\begin{pmatrix} \frac{1}{2} & \frac{1-i}{2} \\ \frac{1-i}{2} & \frac{1}{2} \end{pmatrix}$

Quiz Score: **18** out of 20