
For this test, let $i=\sqrt{-1}$, the unit imaginary number. If z is a complex number, then $\bar{z}$ is the conjugate of z, and $|z|$ is the absolute value of z. Whenever a complex number is given in the standard form a+bi, it can be assumed that a and b are real numbers.

"NOTA" in each question denotes "None of the Above"

1) Which of the following is equivalent to $1+\sqrt{3}i$?

a) $2cis30^\circ$ b) $cis60^\circ$ c) $2cis60^\circ$ d) $4cis30^\circ$ e) NOTA

2) Evaluate $(1+i)^4$

a) -4 b) -4i c) 4 d) 4i e) NOTA

3) Find $|6-8i|$

a) 6+8i b) 10 c) 14 d) 100 e) NOTA

4) Given: z=1+i

Find $(z)\bar{z}+3z-(\bar{z})^2-2\bar{z}$

a. 3-7i b) 1+9i c) 3+7i d) 1+i e) NOTA

5) Evaluate the following determinant:

$$\begin{vmatrix} 1 & 0 & 3 \\ 1 & 2i & 3i \\ 1 & i^2 & i^3 \end{vmatrix}$$

a. -11+3i b) -7+3i c) -9+i d) -1-3i e) NOTA

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6) Simplify: $\dfrac{1}{i+\dfrac{1}{i+\dfrac{1}{i+1}}}$

a. -1 b) 1 c) 2 d) i e) NOTA

7) Evaluate $(1+i)^{17}$

a) 256 b) $256i$ c) $1+i$ d) $1-i$ e) NOTA

8) Express $\sqrt{2i}$ as a complex number in rectangular form.

a) $-\sqrt{2}$ b) $1+i$ c) $-i\sqrt{2}$ d) $1-i$ e) NOTA

9) If $z = 1 + 3i$, find z^4.

a) $100 - 96i$ b) $28 - 96i$ c) $100 + 96i$ d) $28 + 96i$ e) NOTA

10) When $2+3i$ is multiplied by $7-4i$, the resulting complex number is in which quadrant?

a) I b) II c) III d) IV e) NOTA

11) $i^{2001} = ?$

a) -1 b) $-i$ c) i d) 1 e) NOTA

12) Evaluate $(12cis80^\circ)(\frac{1}{3}cis40^\circ)$ and convert the product into a+bi form.

a) $4cis120^\circ$ b) $-2+2i\sqrt{3}$ c) $-2-2i\sqrt{3}$ d) $2+2i\sqrt{3}$ e) NOTA

13) If $f(i \cdot x) = 2ix^3 - 4x^2 + 5ix - 3$, evaluate $f(-i)$.

a) $-7-7i$ b) -2 c) $-12-2i$ d) 2 e) NOTA

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14) If $x^3 + ax^2 + bx + a = 0$ has a root, $3+i$, what is $\frac{a}{b}$.

a) $-\frac{10}{57}$ b) $-\frac{10}{21}$ c) -2.10 d) -5.70 e) NOTA

15) Find the sum of the absolute values of the three cube roots of 8.

a) 2 b) 6 c) $3 + 2i\sqrt{3}$ d) 8 e) NOTA

16) If $z_1 = 1 + \sqrt{5}i$, $z_2 = cis30^\circ$, when $\frac{z_1}{z_2}$ is taken and is in **a+b*i*** form, then what is ***a*** rounded to the thousandths place?

a) 1.984 b) 1.985 c) 2.436 d) 7.937 e) NOTA

17) $\prod_{k=1}^{200} \frac{ki}{k+2} =$

a) $\frac{1}{40602}$ b) $\frac{i}{20301}$ c) $\frac{1}{20301}$ d) $\frac{100i}{101}$ e) NOTA

18) $2e^{\frac{p}{3}i}$ equals exactly which of the following?

a) $1+i$ b) 5.699 c) $0.5 + i\frac{\sqrt{3}}{2}$ d) $1+0.0182i$ e) NOTA

19) Which of the following are true?

I. The product of any complex numbers that are conjugates of each other is a real number.
II. The sum of any two complex numbers that are conjugates of each other is imaginary.
III. The conjugate of i equals the reciprocal of i.

a) I and II only b) II and III only c) I only d) I and III only e) NOTA

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20) If z=2-3i, then $\frac{1}{z} = ?$

a) $\frac{2+3i}{13}$ b) 2+3i c) 2-3i d) $\frac{2-3i}{13}$ e) NOTA

21) The equation $x^6 + 4x^3 + 3x^2 + 16 = 0$ has:

a) 0 real roots and 6 complex roots
b) 2 real roots and 4 complex roots
c) 4 real roots and 2 complex roots
d) 6 real roots and 0 complex roots
e) NOTA

22) For what range of k will $4x^2 + 3x + k = 1$ have 2 imaginary roots?

a) $k > \frac{9}{16}$ b) $k < \frac{9}{16}$ c) $k < \frac{25}{16}$ d) $k > \frac{25}{16}$ e) NOTA

23) Find the sum of the first 25 terms of the given geometric progression: i, -1+i, -2

a) 4095+4096i b) 4096-4095i c) -1 d) -12.5+12.5i e) NOTA

24) If i is a root of the equation $f(x) = 2x^4 - 4x^2 - 6$, find the product of the rational, real roots of this equation.

a) -3 b) -0.5 c) 3 d) 0.5 e) NOTA

25) Solve for x over the Complex Numbers: $x^{\frac{4}{3}} + 15x^{\frac{2}{3}} - 16 = 0$.

a) 1 b) $\{\pm 1, \pm 64i\}$ c) $\{1, \pm 64i\}$ d) $\{\pm 1, 64i\}$ e) NOTA

26) Simplify $\dfrac{6(cis\frac{3p}{4})}{3(cis\frac{p}{6})}$

a) $2cis4.5$ b) -0.518 + 1.931i c) $-\sqrt{2} - i\sqrt{2}$ d) $\frac{-\sqrt{2} - i\sqrt{2}}{2}$ e) NOTA

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27) Which of the following is equivalent to $\left(\frac{\sqrt{2}+i\sqrt{2}}{2}\right)^{4i}$?

a) e^{p} b) e^{-p} c) $e^{i\cdot p}$ d) $e^{-i\cdot p}$ e) NOTA

28) If $f(x)=\frac{3x}{1+x}$ and $f(a)=\frac{9+3i}{4}$, then what is the value of a?

b) 2-i b) 2+i c) 1-2i d) 1+2i e) NOTA

29) Convert $(\sqrt{3}+i)^4$ into trigonometric form.

a) $-16cis60^\circ$ b) $16cis300^\circ$ c) $-16cis300^\circ$ d) $-16cis120^\circ$ e) NOTA

30) If cosh(x)= $\frac{e^{x}+e^{-x}}{2}$ and sinh(x)= $\frac{e^{x}-e^{-x}}{2}$, find $\cosh^2(pi)+\sinh^2(pi)$.

a) 0 b) -1 c) 1 d) 1+i e) NOTA

Answer Key

1) C
2) A
3) B
4) C
5) D
6) B
7) E
8) B
9) B
10) A
11) C
12) B
13) A
14) B
15) B
16) D
17) C
18) E
19) D
20) A
21) A
22) D
23) A
24) A
25) B
26) E
27) B
28) D
29) C
30) C