

MU ALPHA THETA - MAINE '95 REAL & COMPLEX NUMBERS - TOPIC TEST

1. Simplify $(3 + 4i) + (7 - 2i) - (3 - 12i)$

- a. $7 - 10i$ b. $7 + 14i$ c. $-7 + 14i$ d. $-7 - 10i$ e. not given

2. Evaluate: $18 - 3^2 \cdot 4 + 6 + 7 - (5 - 9)^2$

- a. 3 b. 9 c. 15 d. 29 e. not given

3. Which of the following has the same value as i^{63} ?

- a. i b. -1 c. $-i$ d. 1 e. not given

4. Find the product : $(3 - 6i)(4 + 7i)$

- a. $54 - 3i$ b. $-30 + 3i$ c. $-30 - 3i$ d. $54 + 3i$ e. not given

5. If set A is the set of all Real Numbers and
set B is the set of all Complex Numbers and
set C is the set of all Natural Numbers, then

- a. set A is a subset of both B and C. b. set B is a subset of both A and C.
c. sets A and C are both subsets of B. d. sets B and C are both subsets of A.
e. not given

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6. Simplify: $i^{20} + i^{21} + i^{22} + i^{23}$

- a. i b. $-i$ c. 1 d. 0 e. not given

7. If n represents an odd integer, the square of the next larger even integer is

- a. n^2 b. $n^2 + 1$ c. $n^2 + n + 1$ d. $n^2 + 2n + 1$ e. not given

8. $(3 + i) + i =$

- a. 3 b. 4 c. $1 - 3i$ d. $1 + 3i$ e. not given

9. Which one of the following is an irrational number?

- a. $\sqrt[3]{-27}$ b. $\sqrt{2}(3\sqrt{2} + 2\sqrt{8})$ c. $\frac{3\sqrt{18}}{2\sqrt{6}}$ d. $\sqrt{\frac{1}{2}} \cdot \sqrt{\frac{25}{2}}$ e. not given

10. Find a and b if $a + bi = (3 + 4i) - (6 - 3i) - 2i$

- a. $a = 9, b = 1$ b. $a = -3, b = 1$ c. $a = -5, b = 3$
d. $a = -3, b = -1$ e. not given

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11. When is the square root of a number n larger than n ?

- a. When the absolute value of the number is greater than zero and greater than one.
- b. When the absolute value of the number is greater than or equal to zero and less than one.
- c. When the absolute value of the number is between one and negative one inclusive.
- d. When the absolute value of the number is less than -1 or the absolute value of the number is greater than one.
- e. not given

12. If $\sqrt{8 - \frac{7}{6 - \frac{5}{4 - \frac{3}{2}}}} = \frac{a}{b}$ where a and b are relatively prime, then $a + b =$

- a. 7 b. 9 c. 11 d. 13 e. not given

13. If $2x + 3yi = 1 + 4i^2$, then $y = ?$

- a. $\frac{4}{3}$ b. 0 c. $\frac{4}{3}$ d. 4 e. not given

14. When arranging the following real numbers in order from the least to the greatest, what number follows $0.\overline{787}$?

$0.78, 0.\overline{7}, \overline{0.78}, 0.788, 0.\overline{78}, \overline{0.787}, 0.77, 0.787787778\dots$

- a. 0.78 b. $.787787778\dots$ c. $0.\overline{78}$ d. $.788$ e. not given

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15. If $(0.\overline{36} + .4375)$ is written

as a fraction $\frac{a}{b}$ in lowest terms where a and b are relatively prime then b - a is.

- a. 3 b. 17 c. 35 d. 81 e. not given

16. If $\sqrt{75} - 3\sqrt{12} + 5\sqrt{300} + 2\sqrt{48} - 7\sqrt{147} + 3\sqrt{\frac{1}{3}} = a\sqrt{3}$ then a =

- a. -7 b. -4 c. -1 d. 2 e. not given

17. Simplify completely: $i^{100} + i^{73} + i^{23} + \frac{1}{i^3} + i^7$

- a. 0 b. 2i c. -1 d. 1 e. not given

18. If p and q are the coordinates of points on the number line, the distance between the points will always be

- a. p - q b. q - p c. -(p - q) d. |p - q| e. not given

19. Simplify: $9\sqrt{2} + \sqrt{3} \bullet 27\sqrt{18} - \sqrt{12}$

- a. 1 b. $3^{11}\sqrt{2} - 4\sqrt{3}$ c. $3^4\sqrt{2} - \sqrt{3}$ d. $243^{10}\sqrt{2} - 4\sqrt{3}$ e. not given

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20. If a and b are real numbers, then under which of the following conditions is $\sqrt{a}\sqrt{b} = \sqrt{ab}$ not true?

- a. $a > 0, b > 0$ b. $a < 0, b > 0$ c. $a < 0, b < 0$ d. $a > 0, b < 0$
e. not given

21. Expand and simplify: $(16 + (2 + 2i)^2)^2$

- a. $4i$ b. $-4i$ c. 4 d. -4 e. not given

22. Which of the following statements is false?

- a. The additive inverse of the additive inverse of a number is the number.
b. The multiplicative inverse of the multiplicative inverse of a number is the number, except when the number is 0.
c. Zero is its own additive inverse.
d. The only integer that is its own multiplicative inverse is 1.
e. not given

23. If $3^{\frac{a}{b}} = 3\sqrt{9\sqrt[3]{3}}$, where a and b are relatively prime, then $a + b$ is

- a. 28 b. 25 c. 24 d. 23 e. not given

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24. Find $|4 + 6i|$.

- a. $4 + 6i$ b. $4 - 6i$ c. $-4 - 6i$ d. $4i\sqrt{5}$ e. not given

25. Which of the following equations has (have) solutions in the complex number system?

I. $x^2 - 1 = 0$ II. $x^2 - 2 = 0$ III. $x^2 + 2 = 0$

- a. III only b. II and III only c. I and III only d. All of these
e. not given

26. Under how many operations, i.e. addition, subtraction, multiplication, division, is the set of irrational number closed?

- a. 1 b. 2 c. 3 d. 4 e. not given

27. If $\left[\left(\frac{12}{5}\right)^{-2} - (4)^{-2}\right]^{\frac{1}{2}} = \frac{a}{b}$ where a and b are relatively prime, then $2a - 3b =$

- a. -7 b. -4 c. -1 d. 2 e. not given

28. Simplify $\frac{(1-i)^{12}}{8i}$

- a. $8i$ b. 8 c. -8 d. $-8i$ e. not given

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29. Simplified $\sqrt{2\sqrt{63} + \frac{2}{8+3\sqrt{7}}}$ is

- a. $12\sqrt{7}$ b. $2\sqrt{7}$ c. 4 d. 2 e. not given

30. Which of the following statements is (are) true?

- I. The product of any two 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. III only e. not given