1.5: Complex Numbers

1. If $\sqrt{-4}\sqrt{-9} + 2i^{99} - \sqrt[3]{-27} = a + bi$, where $i = \sqrt{-1}$, then $a + b =$

   A) -5

   B) -11

   C) 5

   D) 11

   E) 7

2. If a is the real part and b is the imaginary part of the complex number $z = \frac{(3-4i)(3+4i)}{10-5i}$, where $i = \sqrt{-1}$, then $a + b =$

   A) 3

   B) 15

   C) 5

   D) 1

   E) -5

3. The standard form of the complex number $\frac{2-3i}{1-2i}+\frac{\sqrt{-36}}{\sqrt{-4}\sqrt{-9}}$, is

A) $\frac{8}{5}-\frac{4}{5}i$

B) $\frac{3}{5}+\frac{4}{5}i$

C) $\frac{1}{5}-\frac{2}{5}i$

D) $\frac{4}{5}-\frac{3}{5}i$

E) $\frac{6}{5}+\frac{4}{5}i$

4. The sum of the real and imaginary parts of the complex number $(1-2i)(\sqrt{-4}-\sqrt[3]{-27})+i^{11}$, is equal to

A) 2

B) 4

C) 8

D) 10

E) 12

5. The conjugate of the complex number $(2-3i)^{-1}$ is

A) $\frac{2}{13}-\frac{3}{13}i$

B) $\frac{2}{13}+\frac{3}{13}i$

C) $\frac{1}{2}+\frac{1}{3}i$

D) $\frac{1}{2}-\frac{1}{3}i$

E) $-\frac{2}{5}+\frac{3}{5}i$

6. If $a \pm bi$ are the nonreal complex solutions of the equation $x^3+1=0$, then $a \cdot b =$

A) $\frac{\sqrt{3}}{4}$

B) 1

C) $\frac{\sqrt{3}}{2}$

D) $\frac{1}{2}$

E) $\frac{1}{4}$

7. If $z = -\sqrt{-2^2} + \frac{1-3i}{1+i}$, where $i = \sqrt{-1}$, then the conjugate of z is

A) $-1 + 4i$

B) $1 - 4i$

C) $1 + 4i$

D) -1

E) 1

8. If $i(3 - 2i)^2 = x + yi$, where x and y are real numbers, then the value of $x + y$ is equal to:

A) 17

B) -7

C) 19

D) -19

E) 5

9. If $z = i$, then $z^{1001} + 2z^{1000} + 3z^{999} + 4z^{998} =$

A) $-2 - 2i$

B) $-2 + 2i$

C) $2 - 2i$

D) $2 - i$

E) $3 + 2i$

10. If $i = \sqrt{-1}$ and $z = 1 + i\sqrt{3}$, then $\frac{1}{i}(z^2 - 2z)$ is equal to

A) $4i$

B) $-2 + 3i$

C) $-3i$

D) 1-3i

E) $6i$

11. If $i = \sqrt{-1}$ and $z = \frac{7-3i}{1+i} - i^{51}$, then the conjugate of z in standard form is

A) $\bar{z} = 2 + 4i$

B) $\bar{z} = 2 - 2i$

C) $\bar{z} = -2 - 4i$

D) $\bar{z} = -2 + 4i$

E) $\bar{z} = 2 - 4i$

12. The expression $(\sqrt{-2} + \sqrt{-3})(\sqrt{-8} - \sqrt{-27}) + \frac{1}{i^{86}}$ simplifies to

A) $4 + \sqrt{6}$

B) $-4 + \sqrt{5}$

C) $-3 + \sqrt{6}$

D) $4 + \sqrt{6}i$

E) $4 - \sqrt{6}$

13.The sum of the real part and the imaginary part of the complex number $\frac{\sqrt{-4}(\sqrt[3]{-27}-\sqrt{-16})}{(1+i)^2}$ is equal to

A) -7

B) -1

C) 1

D) $4i$

E) -2

14.One of the nonreal complex solutions of the equation $x^3 - 8 = 0$ is

A) $-1+\sqrt{3}i$

15.The expression $(3-2i)^2(1-3i)+\sqrt[3]{-8}\sqrt{-9}$ simplifies to

A) $-31-33i$

16.The conjugate of $\frac{3+2i}{5-i}$ is

A) $\frac{1}{3}-\frac{1}{3}i$

B) $\frac{1}{2}+\frac{1}{2}i$

C) $\frac{1}{5}-\frac{1}{5}i$

D) $\frac{1}{5}+\frac{1}{5}i$

E) $\frac{1}{2}-\frac{1}{2}i$

17.The conjugate of the complex number $\frac{8+i^7}{2+3i^{13}}$ in standard form is

A) $1+2i$

18.Let $i=\sqrt{-1}$. If $\frac{\sqrt{-2}\sqrt{-8}-i^{23}}{\sqrt[3]{-8}+i}=A+Bi$, then $A+B=$

A) $\frac{11}{5}$

B) -2

C) $\frac{13}{5}$

D) 1

E) $\frac{7}{5}$

18.If the quadratic equation $x^2 + 2kx + 2k = -3$ has two non-real complex solutions, then the set of all values of k is

A) $(-\infty, 0) \cup (2, \infty)$

B) $(-1,3)$

19. If $\frac{10}{2+i} + \frac{6\sqrt[3]{-8}}{\sqrt{-9}\sqrt{-4}} = a + bi$, where $i = \sqrt{-1}$, then $a + b =$

A) - 2

B) 6

C) 2

D) 4

E) -1

20. For $i = \sqrt{-1}$, which ONE of the following is FALSE

A) $\sqrt{-5}\sqrt{-2} = \sqrt{10}$

21. Let $i = \sqrt{-1}$. If $(\sqrt{2} - \sqrt{-2})(\sqrt{8} + \sqrt{-2}) + \sqrt[3]{-8} = a + bi$, then $a + b =$

A) 2

22.If $z = \frac{(2+i)^2}{i^7}$, then write z in standard form

A) $-4 + 3i$

23. The solutions of the equation $\frac{1}{2}x^2 + \frac{4}{3}x + 1 = 0$ are

A) $-\frac{4}{3} \pm \frac{\sqrt{2}}{3}i$

24.For $i = \sqrt{-1}$, the expression $(\sqrt[3]{-8})(\sqrt{-9}) - \frac{1+i^7}{1+i} =$

A) $-5i$

B) $-6 + i$

C) $-6 - i$

D) $-7i$

E) $6 + i$