

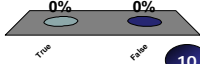
# Complex Numbers

Concept tests

13.1. For any complex number  $z$ , the product  $z \cdot \bar{z}$  is a real number

- True
- False

0 of 5

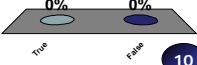


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13.2. The square of any complex number is a real number

- True
- False

0 of 5

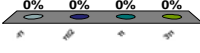


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13.3. What is  $\text{Arg}(z)$  for  $z = -5$ ?

- $-\pi$
- $\pi/2$
- $\pi$
- $3\pi$

0 of 5



10

13.4. Which of the following are cubic roots of  $i$ ?

- $\cos(\pi/3) + \sin(\pi/3)i$
- $\cos(2\pi/3) + \sin(2\pi/3)i$
- $-i$
- $\cos(5\pi/6) + \sin(5\pi/6)i$

- A and B
- C
- B and C
- C and D

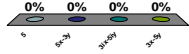
0 of 5

10

13.5. The imaginary part,  $v$ , of  $f(z) = 3iz + 5\bar{z}$  is...

- 5
- $5x - 3y$
- $3ix - 5iy$
- $3x - 5y$

0 of 5




10

13.6. The product of two analytic functions is analytic

- True
- False

0 of 5

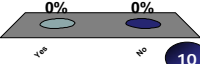


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13.7. Is the function  $|z|^2$  entire?

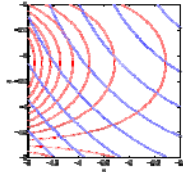
- Yes
- No

0 of 5

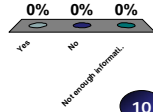


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13.8. The graph below shows a contour plot of two functions  $u(x,y)$  and  $v(x,y)$ . Is the function  $f(z) = u(x,y) + i v(x,y)$  analytic?



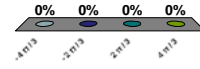
1. Yes
2. No
3. Not enough information to decide



0 of 5

13.9. What is  $\text{Arg}(1/z)$ , where  $z = -1 - \sqrt{3}i$  ?

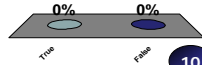
1.  $-4\pi/3$
2.  $-2\pi/3$
3.  $2\pi/3$
4.  $4\pi/3$



0 of 30

13.10. Any solution of the equation  $z^4 - 16 = 0$  may be written in the form  $z = 2w$ , where  $w$  is a fourth root of unity

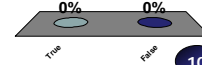
1. True
2. False



0 of 30

13.11. If  $z$  is a complex number, then  $e^{iz}$  has modulus 1.

1. True
2. False

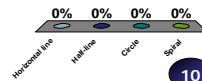


0 of 30

3

13.12. The curve of equation  $e^{t+ib}$ , where  $t$  and  $b$  are real numbers,  $t$  varies and  $b$  is fixed, is a ...

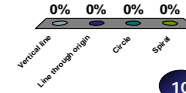
1. Horizontal line
2. Half-line
3. Circle
4. Spiral



0 of 30

13.13. The curve of equation  $e^{(a+ib)t}$ , where  $a$  and  $b$  are given real numbers and  $t$  varies in  $[-1,1]$ , is part of a

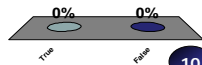
1. Vertical line
2. Line through origin
3. Circle
4. Spiral



0 of 30

13.14. Every nonzero complex number  $z$  can be written in the form  $z = e^w$ , where  $w$  is another complex number.

1. True
2. False



0 of 30

4