ST. LAWRENCE HIGH SCHOOL

A JESUIT CHRISTIAN MINORITY INSTITUTION

FOR GOD AND COUNTRY

SOLUTIONS OF WORKSHEET-8

SUBJECT – MATHEMATICS

1st - Term

Chapter: ALGEBRA **Class: XI**

Topic: Complex numbers **Date: 13.07.2020**

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1 $\sin x + i \cos 2x$ and $\cos x - i \sin 2x$ are conjugate to each other for:

(A) $x = n\pi$ (B) $x = \left(n + \frac{1}{2}\right)\frac{\pi}{2}$

(C) $x = 0$ (D) No value of x

2 The real value of α for which the expression $\frac{1 - i\sin\alpha}{1 + 2i\sin\alpha}$ is purely real is :

(A) $(n+1)\frac{\pi}{2}$ (B) $(2n + 1)\frac{\pi}{2}$

(C) $n\pi$ (D) None of these, where $n \in \mathbf{N}$

3 If $z = x + iy$ lies in the third quadrant, then $\frac{\overline{z}}{z}$ also lies in the third quadrant if

(A) $x > y > 0$ (B) $x < y < 0$

(C) $y < x < 0$ (D) $y > x > 0$

4 The value of $(z + 3)(\overline{z} + 3)$ is equivalent to

(A) $|z+3|^2$ (B) $|z-3|$

(C) $z^2 + 3$ (D) None of these

5 If $\left(\frac{1+i}{1-i}\right)^x = 1$, then

(A) $x = 2n+1$ (B) $x = 4n$

(C) $x = 2n$ (D) $x = 4n + 1$, where $n \in \mathbf{N}$

6 A real value of x satisfies the equation $\left(\frac{3-4ix}{3+4ix}\right) = \alpha - i\beta \ (\alpha, \beta \in \mathbf{R})$ if $\alpha^2 + \beta^2 =$

(A) 1 (B) -1 (C) 2 (D) -2

7 Which of the following is correct for any two complex numbers z_1 and z_2?

(A) $|z_1 z_2| = |z_1||z_2|$ (B) $\arg(z_1 z_2) = \arg(z_1).\ \arg(z_2)$

(C) $|z_1 + z_2| = |z_1| + |z_2|$ (D) $|z_1 + z_2| \geq |z_1| - |z_2|$

8 The point represented by the complex number $2 - i$ is rotated about origin through an angle $\frac{\pi}{2}$ in the clockwise direction, the new position of point is:

(A) $1 + 2i$ (B) $-1 - 2i$ (C) $2 + i$ (D) $-1 + 2i$

9 Let $x, y \in \mathbf{R}$, then $x + iy$ is a non real complex number if:

(A) $x = 0$ (B) $y = 0$ (C) $x \neq 0$ (D) $y \neq 0$

10 If $a + ib = c + id$, then

(A) $a^2 + c^2 = 0$ (B) $b^2 + c^2 = 0$

(C) $b^2 + d^2 = 0$ (D) $a^2 + b^2 = c^2 + d^2$

11 The complex number z which satisfies the condition $\left|\frac{i+z}{i-z}\right| = 1$ lies on

(A) circle $x^2 + y^2 = 1$ (B) the x-axis

(C) the y-axis (D) the line $x + y = 1$.

12 If z is a complex number, then

(A) $|z^2| > |z|^2$ (B) $|z^2| = |z|^2$

(C) $|z^2| < |z|^2$ (D) $|z^2| \geq |z|^2$

13 $|z_1 + z_2| = |z_1| + |z_2|$ is possible if

(A) $z_2 = \overline{z_1}$ (B) $z_2 = \frac{1}{z_1}$

(C) $\arg(z_1) = \arg(z_2)$ (D) $|z_1| = |z_2|$

14 The real value of θ for which the expression $\frac{1+i\cos\theta}{1-2i\cos\theta}$ is a real number is:

(A) $n\pi+\frac{\pi}{4}$ (B) $n\pi+(-1)^n\frac{\pi}{4}$

(C) $2n\pi\pm\frac{\pi}{2}$ (D) none of these.

15 The value of arg (x) when $x < 0$ is:

(A) 0 (B) $\frac{\pi}{2}$

(C) π (D) none of these

Ans.

1.D , 2.C , 3.B , 4.A , 5.B , 6.A , 7.A , 8.B ,

9.D , 10.D , 11.B , 12.B , 13.C , 14.C , 15.C

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