

$$i^2 = -1$$

(1)

17/10/18 Lecture #1 Calculus and Analytical Geometry (1)

Real Number:-

Natural Numbers $N = \{1, 2, 3, \dots\}$

Whole Numbers $W = \{0, 1, 2, 3, \dots\}$

Integers $Z = \{\dots, -3, -2, -1, 0, 1, 2, 3, \dots\}$

Rational Numbers $Q = \left\{ \frac{p}{q} \mid p, q \in Z, q \neq 0 \right\}$

Irrational Numbers $Q' = \left\{ x \mid x \neq \frac{p}{q}, p, q \in Z, q \neq 0 \right\}$,
 i.e. $R = Q \cup Q'$

Complex Number:- $x + iy$, $x, y \in R$, $i = \sqrt{-1}$

x is real part and y is imaginary part.

$$i = \sqrt{-1}, i^2 = -1$$

Conjugate of a complex Number:- (z bar)

if $z = a + bi$ then $\bar{z} = a - bi$ called conjugate of z

$$z = -2 + 3i, \bar{z} = -2 - 3i \text{ (by replacing } i \text{ by } -i)$$

Simplify i^9

$$\begin{aligned} i^2 &= -1 \\ i^3 &= i^2 \times i = -i \\ i^4 &= i^2 \times i^2 = (-1) \times (-1) = 1 \\ i^5 &= (i^2)^2 \times i = (-1)^2 \times i = i \\ i^{10} &= (i^2)^5 = (-1)^5 = -1 \end{aligned}$$

$$i^9 = i^8 \times i = (i^4)^2 \times i = 1^2 \times i = i$$

$$(i^3)^2 = (-i)^2 = (-1)^2 \times i^2 = 1 \times (-1) = -1$$

$$(i)^{19}$$

$$i^{19} = (i^4)^4 \times i^3 = 1^4 \times (-i) = -i$$

Conjugate

$$A = \frac{-3 + 4i}{-3 - 4i}$$

$$Z = -i$$

$$\text{Ans } \bar{Z} = i \quad \checkmark$$

Find value of x & y if

$$\sqrt{x + iy + 1} = 4 - 3i$$

$$\text{formule} = \sqrt{a + bi} = c + di$$

$$a = c^2 - d^2 \text{ and } b = 2cd$$

$$\text{Sol } x + iy = 4 - 3i - 1$$

$$x + iy = 3 - 3i$$

$$x = 3, y = -3$$

$$2x + y^2 i = 4 + 9i$$

$$2x = 4 \Rightarrow x = 2$$

$$y^2 = 9 \Rightarrow y = \pm 3$$

$$(iii) i^{-3} \quad (iv) i^{-10}$$