

Section 6.5 Trigonometric Form of a Complex Number

Objective: In this lesson you learned how to multiply and divide complex numbers written in trigonometric form and how to find powers and n th roots of complex numbers.

Course Number

Instructor

Date

Important Vocabulary

Define each term or concept.

n th roots of unity

I. The Complex Plane (Page 448)

The absolute value of the complex number $a + bi$ is defined as . . .

What you should learn

How to find absolute values of complex numbers

The absolute value of the complex number $z = a + bi$ is

given by $|a + bi| = \sqrt{\quad}$.

II. Trigonometric Form of a Complex Number (Pages 449–450)

The **trigonometric form of the complex number** $z = a + bi$ is

$$z = \quad,$$

where $a = \quad,$

$$b = \quad,$$

$$r = \sqrt{\quad}, \text{ and}$$

$$\tan \theta = \quad.$$

What you should learn

How to write trigonometric forms of complex numbers

The number r is the _____ of z , and θ is called an _____ of z .

The trigonometric form of a complex number is also called the _____.

III. Multiplication and Division of Complex Numbers

(Pages 450–451)

Let $z_1 = r_1(\cos \theta_1 + i \sin \theta_1)$ and $z_2 = r_2(\cos \theta_2 + i \sin \theta_2)$ be complex numbers. Then:

$$z_1 z_2 = \underline{\hspace{10em}}$$

$$z_1/z_2 = \underline{\hspace{10em}}$$

Describe how to multiply two complex numbers.

Describe how to divide two complex numbers.

What you should learn

How to multiply and divide complex numbers written in trigonometric form

IV. Powers of Complex Numbers (Page 452)

State **DeMoivre's Theorem**.

What you should learn

How to use DeMoivre's Theorem to find powers of complex numbers

IV. Roots of Complex Numbers (Pages 453–455)

The complex number $u = a + bi$ is an ***n*th root** of the complex number z if _____.

For a positive integer n , the complex number $z = r(\cos \theta + i \sin \theta)$ has _____ given by

$$\sqrt[n]{r} \left(\cos \frac{\theta + 2\pi k}{n} + i \sin \frac{\theta + 2\pi k}{n} \right), \text{ where } k = 0, 1, 2, \dots, n - 1.$$

What you should learn

How to find *n*th roots of complex numbers

Homework Assignment

Page(s)

Exercises