

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.

Real axis

Imaginary axis

Absolute value of a complex number $a + bi$ n th roots of unity

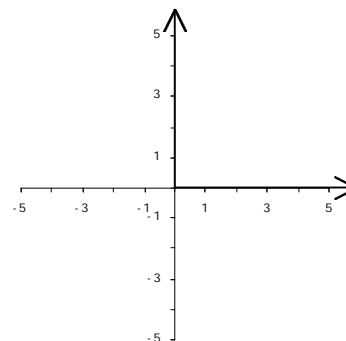
I. The Complex Plane (Page 532)

The **complex plane** is . . .

On the complex plane shown at the right, (a) label the real axis, (b) label the imaginary axis, and (c) plot and label the complex numbers $-2 - 3i$ and $4 + i$.

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

$$|a + bi| = \sqrt{\quad}$$



What you should learn

How to plot complex numbers in the complex plane

II. Trigonometric Form of a Complex Number

(Pages 533–534)

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

$$z = \underline{\hspace{2cm}},$$

where $a = \underline{\hspace{2cm}},$

$$b = \underline{\hspace{2cm}},$$

$$r = \sqrt{\underline{\hspace{2cm}}}, \text{ and}$$

$$\tan q = \underline{\hspace{2cm}}.$$

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

What you should learn

How to write the trigonometric forms of complex numbers

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

III. Multiplication and Division of Complex Numbers

(Pages 534–535)

Let $z_1 = r_1(\cos \mathbf{q}_1 + i \sin \mathbf{q}_1)$ and $z_2 = r_2(\cos \mathbf{q}_2 + i \sin \mathbf{q}_2)$ be complex numbers. Then:

$$z_1 z_2 = \underline{\hspace{4cm}}$$

$$z_1/z_2 = \underline{\hspace{4cm}}$$

Describe how to find the product of two complex numbers.

Describe how to find the quotient of two complex numbers.

What you should learn

How to multiply and divide complex numbers written in trigonometric form

IV. Powers of Complex Numbers (Page 536)

State DeMoivre's Theorem.

What you should learn

How to use De Moivre's Theorem to find powers of complex numbers

IV. Roots of Complex Numbers (Pages 537–539)

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

What you should learn

How to find *n*th roots of complex numbers

For a positive integer n , the complex number $z = r(\cos \mathbf{q} + i \sin \mathbf{q})$ has _____ given

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

Homework Assignment

Page(s)

Exercises