Course Number

Instructor

Date

Section 8.5 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 nth roots of complex numbers.

Important Vocabulary Define each term or concept.

Real axis

Imaginary axis

Absolute value of a complex number $a + bi$

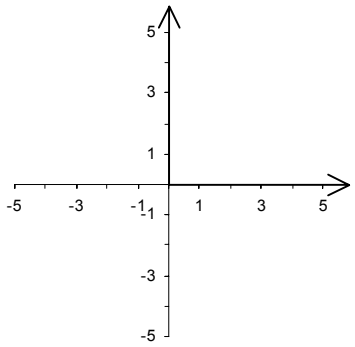
***n*th roots of unity**

I. The Complex Plane (Page 637)

What you should learn
How to plot complex numbers in the complex plane

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

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

II. Trigonometric Form of a Complex Number (Pages 638–639)

What you should learn
How to write the trigonometric forms of complex numbers

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

$z =$ _____,

where $a =$ _____,

$b =$ _____,

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

$\tan\theta =$ _____.

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 639–640)

What you should learn
How to multiply and divide complex numbers written in trigonometric form

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_1z_2 = _____

z_1/z_2 = _____

Describe how to find the product of two complex numbers.

Describe how to find the quotient of two complex numbers.

IV. Powers of Complex Numbers (Page 641)

What you should learn
How to use DeMoivre's Theorem to find powers of complex numbers

State DeMoivre's Theorem.

V. Roots of Complex Numbers (Pages 642–644)

What you should learn
How to find *n*th roots of complex numbers

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

Homework Assignment

Page(s)

Exercises