Course Number

Instructor

Date

Section 2.3 Complex Numbers

Objective: In this lesson you learned how to perform operations with complex numbers and plot complex numbers in the complex plane.

Important Vocabulary Define each term or concept.

Complex number

Complex conjugates

Fractal geometry

Imaginary axis

Real axis

Fractal

Mandelbrot Set

Bounded

Unbounded

I. The Imaginary Unit *i* (Page 180)

What you should learn
How to use the imaginary unit *i* to write complex numbers

Mathematicians created an expanded system of numbers using the **imaginary unit *i*,** defined as $i =$ _____, because . . .

By definition, $i^2 =$ _____.

For the complex number $a + bi$, if $b = 0$, the number $a + bi = a$ is a(n) _____. If $b \neq 0$, the number $a + bi$ is a(n) _____. If $a = 0$, the number $a + bi = bi$ is a(n) _____.

The set of complex numbers consists of the set of _____ _____ and the set of _____.

Two complex numbers $a + bi$ and $c + di$, written in standard form, are equal to each other if . . .

II. Operations with Complex Numbers (Pages 181–182)

What you should learn
How to add, subtract, and multiply complex numbers

To add two complex numbers, . . .

To subtract two complex numbers, . . .

The additive identity in the complex number system is _____.

The additive inverse of the complex number $a + bi$ is _____.

Example 1: Perform the operations:
$(5 - 6i) - (3 - 2i) + 4i$

To multiply two complex numbers $a + bi$ and $c + di$, . . .

Example 2: Multiply: $(5 - 6i)(3 - 2i)$

III. Complex Conjugates and Division (Page 183)

What you should learn
How to use complex conjugates to divide complex numbers

The product of a pair of complex conjugates is a(n) _____ number.

To find the quotient of the complex numbers $a + bi$ and $c + di$, where c and d are not both zero, . . .

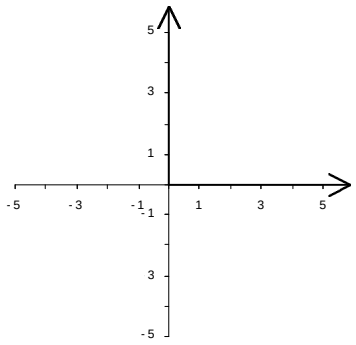
Example 3: Divide $(1 + i)$ by $(2 - i)$. Write the result in standard form.

IV. Applications of Complex Numbers (Pages 184–185)

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

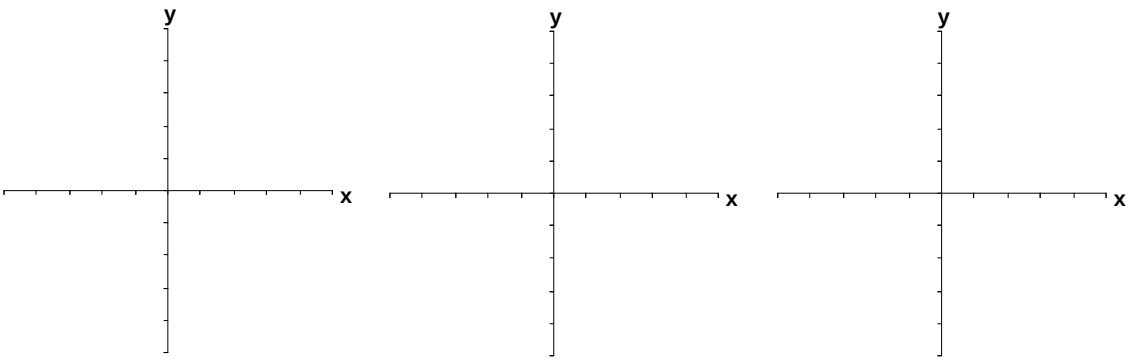
The **complex plane** is . . .

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

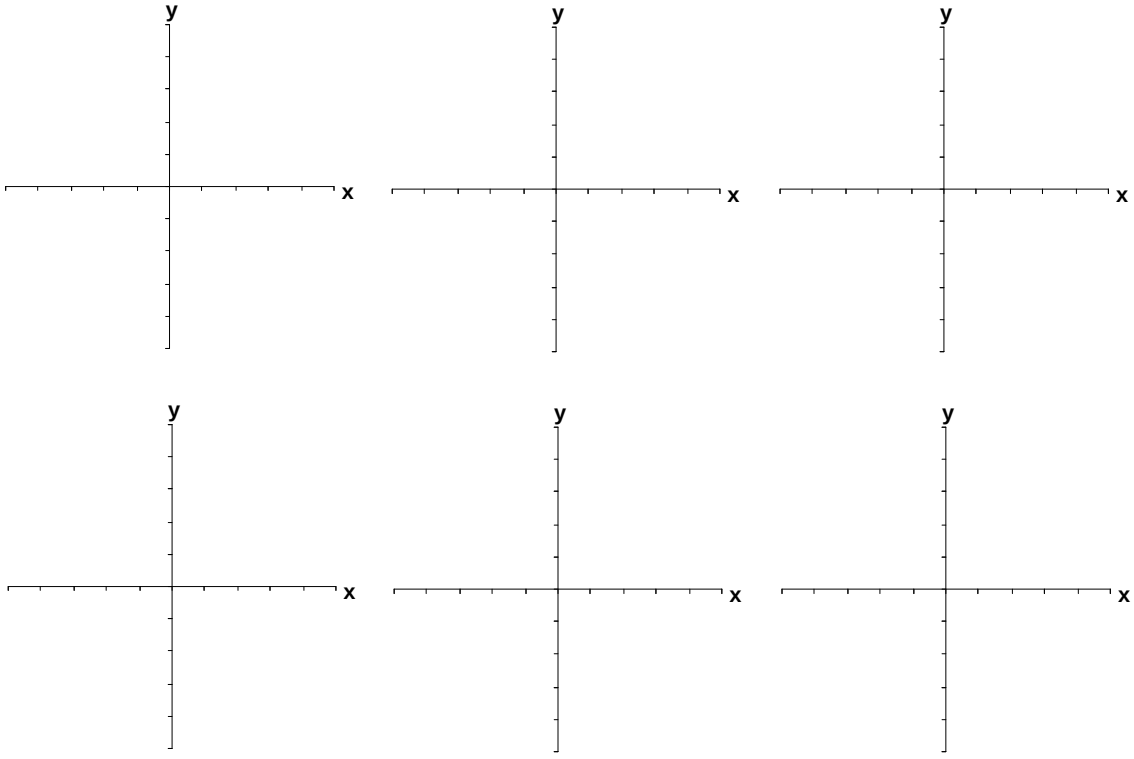


Let c represent a complex number. Describe how to tell whether or not c belongs to the Mandelbrot Set.

Describe how the Mandelbrot Set could be graphed.



Additional notes



Homework Assignment

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Exercises