1.1 Complex Numbers HW

Imaginary and Complex Numbers

METHODS AND MEANINGS
MATH NOTES

The imaginary number ***i*** is defined as the square root of –1, so $i = \sqrt{-1}$. Therefore $i^2 = -1$, and the two solutions of the equation $x^2 + 1 = 0$ are $x = i$ and $x = -i$.

In general, i follows the rules of real number arithmetic. The sum of two imaginary numbers is imaginary (unless it is 0). Multiplying the imaginary number i by every possible real number would yield the set of all the imaginary numbers.

The set of numbers that solve equations of the form x^2 = (a negative real number) is called the set of **imaginary numbers**. Imaginary numbers are not positive, negative, or zero. The collection (set) of positive and negative numbers (integers, rational numbers (fractions), and irrational numbers), are referred to as the **real numbers**.

The sum of a real number (other than zero) and an imaginary number, such as $2 + i$, is generally neither real nor imaginary. Numbers such as these, which can be written in the form $a + bi$, where a and b are real numbers, are called **complex numbers**. Each complex number has a real component, a, and an imaginary component, bi. The real numbers are considered to be complex numbers with $b = 0$, and the imaginary numbers are complex numbers with $a = 0$.

- **1.** Write each of the following expressions in the form $a + bi$. *Help*

  a. $-18 - \sqrt{-25}$ b. $\frac{2 \pm \sqrt{-16}}{2}$ c. $5 + \sqrt{-6}$

- **2.** Explain why $i^3 = -i$. What does i^4 equal? *Help*

- **3.** If $f(x) = x^2 + 7x - 9$, calculate the values in parts (a) through (c) below. *Help*

  a. $f(-3)$ b. $f(i)$ c. $f(-3 + i)$

- **4.** Is $5 + 2i$ a solution to $x^2 - 10x = -29$? How can you be sure? *Help*

- **5.** Calculate the value of each expression below. *Help*

  a. $\sqrt{-49}$ b. $\sqrt{-2}$ c. $(4i)^2$ d. $(3i)^3$