

## Section 3.4 The Fundamental Theorem of Algebra

**Objective:** In this lesson you learned how to determine the number of zeros of polynomial functions and find them.

Course Number

Instructor

Date

### Important Vocabulary

Define each term or concept.

**Fundamental Theorem of Algebra**

**Linear Factorization Theorem**

**Conjugates**

### I. The Fundamental Theorem of Algebra (Pages 264–265)

In the complex number system, every  $n$ th-degree polynomial function has \_\_\_\_\_ zeros.

**Example 1:** How many zeros does the polynomial function  $f(x) = 5 - 2x^2 + x^3 - 12x^5$  have?

An  $n$ th-degree polynomial can be factored into \_\_\_\_\_ linear factors.

**Example 2:** List all of the zeros of the polynomial function  $f(x) = x^3 - 2x^2 + 36x - 72$ .

#### *What you should learn*

How to determine the number of zeros of polynomial functions and how to find all zeros of polynomial functions, including complex zeros

### II. Conjugate Pairs (Page 266)

Let  $f(x)$  be a polynomial function that has real coefficients. If  $a + bi$ , where  $b \neq 0$ , is a zero of the function, then we know that \_\_\_\_\_ is also a zero of the function.

#### *What you should learn*

How to find conjugate pairs of complex zeros

**III. Factoring a Polynomial** (Pages 266–268)

To write a polynomial of degree  $n > 0$  with real coefficients as a product without complex factors, write the polynomial as . . .

***What you should learn***  
How to find zeros of polynomials by factoring

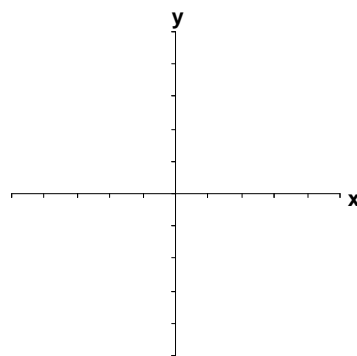
A quadratic factor with no real zeros is said to be

\_\_\_\_\_.

**Example 3:** Write the polynomial  $f(x) = x^4 + 5x^2 - 36$

- (a) as the product of linear factors and quadratic factors that are irreducible over the reals, and
- (b) in completely factored form.

Explain why a graph cannot be used to locate complex zeros.

**Additional notes****Homework Assignment**

Page(s)

Exercises