

LESSON 6.9

NAME _____

DATE _____

Reteaching with Practice

For use with pages 380–386

GOAL

How to use finite differences to determine the degree of a polynomial function that will fit a set of data and how to use technology to find polynomial models for real-life data

VOCABULARY

Finding **finite differences** is a process which uses triangular numbers to decide whether y -values for equally spaced x -values can be modeled by a polynomial function. The properties of finite differences are listed below.

1. If a polynomial function $f(x)$ has degree n , then the n th-order differences of function values for equally spaced x -values are nonzero and constant.
2. Conversely, if the n th-order differences of equally spaced data are nonzero and constant, then the data can be represented by a polynomial function of degree n .

EXAMPLE 1

Writing a Cubic Function

Write the cubic function whose graph is shown.

SOLUTION

Begin by using the three x -intercepts to write the function in factored form:

$$f(x) = a(x + 1)(x - 2)(x - 3)$$

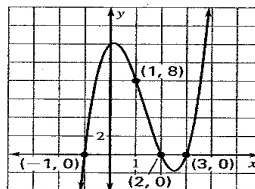
Then solve for a by substituting the coordinates of the point $(1, 8)$.

$$8 = a(1 + 1)(1 - 2)(1 - 3)$$

$$8 = 4a$$

$$2 = a$$

The cubic function is $f(x) = 2(x + 1)(x - 2)(x - 3)$.



Exercises for Example 1

Write the cubic function whose graph is shown.

