TI-𝑛spire™

Grade level: secondary
Subject: Algebra I or II
Time required: 45 minutes

Polynomial End Behavior
Tiffani S. Ellison

Activity Overview

In this activity, students will discover the relationship between the degree and leading coefficient of a polynomial and the number of turns and end behavior of a graph. They will discover the maximum number of turns is always one less than the degree. They will also find that negative leading coefficients will result in the right end behavior going down. Lastly the students will find that the graphs of even degree polynomials will be the same on each end and odd degree will be different. When complete, students should be able to describe the graph of a polynomial given its equation.

Concepts:

Tennessee Algebra II Standard
SPI 3102.3.11 Analyze nonlinear graphs including quadratic and exponential functions that model a contextual situation.

Teacher Preparation

- This activity is designed to be completed in an Algebra I or II class.

- Prior to this activity students should have an understanding of polynomials, degrees, coefficients and standard form of a polynomial. It is suggested that students have previously graphed linear and quadratic functions.

- This activity requires students to graph polynomials as needed.

The Classroom.
- The activity is designed to be completed by students individually with or without partner checks throughout.

TI-Nspire Applications

Notes, Graphs & Geometry

Assessment and Evaluation

- Students can be given sample polynomial equations and asked to describe the graph. They can be given a chart similar to the one from the handout. A teacher may find adding the column indicating whether the end behavior is "same" or "different" may help students more. Further discussion needs to take place about the maximum number of turns and how that number can be reduced by an even whole number.

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<u>Polynomial End Behavior</u>
Student Worksheet

In this activity, you will explore:

- Maximum number of turns of the graph of a polynomial
- End behavior of the graph of a polynomial
- Effects of leading coefficient and degree of the polynomial on the graph of the polynomial

Open the document and read through the first three pages. Answer the questions on page 2 and check your answer.

Once on page 1.4 you will need to record your answers in the table below.

To help you get started. The figure to the right is from Page 1.4

Record the equation of the polynomial below along with the degree and the leading coefficient.

Grab and pull the screen to verify the graph does not change direction again before completing the chart. Once you have the answers for this graph move along to the remaining graphs.

Polynomial Equation	Degree of Polynomial	Leading Coefficient	Number of Turns (How many times does it change direction?)	Direction of Left Arrow	Direction of Right Arrow

PAUSE   Discuss the problem with your partner.

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WRITE THE RULES:

You can determine each of the rules for the graph of a polynomial simply by looking at the equation of the polynomial.

Discuss the following with your partner.

1. How do you determine the maximum number of turns in a graph?

2. What determines if the end behavior of the graph will be the same or different?

3. What must exist for the right end behavior to be down?

4. According to your rules can a 5th degree polynomial turn three times? Why or why not?