

# Precalculus for Team-Based Inquiry Learning

2024 Development Edition

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TBIL Fellows

October 10, 2023

**Website:** [Precalculus for Team-Based Inquiry Learning](https://teambasedinquirylearning.github.io/prec calculus/)<sup>1</sup>

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# Chapter 1

## Polynomial and Rational Functions (PR)

### Objectives

BIG IDEA for the chapter goes here, in outcomes/main.ptx

By the end of this chapter, you should be able to...

1. Graph quadratic functions and identify their axis of symmetry, and maximum or minimum point.
2. Use quadratic models to solve an application problem and establish conclusions.
3. Rewrite a rational function as a polynomial plus a proper rational function.
4. Determine the zeros of a real polynomial function, write a polynomial function given information about its zeros and their multiplicities, and apply the Factor Theorem and the Fundamental Theorem of Algebra.
5. Find the intercepts, estimated locations of maxima and minima, and end behavior of a polynomial function, and use this information to sketch the graph.
6. Find the domain and range, vertical and horizontal asymptotes, and intercepts of a rational function and use this information to sketch the graph.

## Graphing Quadratic Functions (PR1)

### 1.1 Graphing Quadratic Functions (PR1)

#### Objectives

- Graph quadratic functions and identify their axis of symmetry, and maximum or minimum point.

## Graphing Quadratic Functions (PR1)

**Activity 1.1.1** Activities may start with an <introduction>.

(a) Then we can ask students to do some <task>s.

(b) Here's a second <task>.

## **1.2 Quadratic Models and Meanings (PR2)**

### **Objectives**

- Use quadratic models to solve an application problem and establish conclusions.



## Quadratic Models and Meanings (PR2)

**Activity 1.2.1** Activities may start with an <introduction>.

(a) Then we can ask students to do some <task>s.

(b) Here's a second <task>.

## 1.3 Polynomial Long Division (PR3)

### Objectives

- Rewrite a rational function as a polynomial plus a proper rational function.

### Polynomial Long Division (PR3)

**Activity 1.3.1** Activities may start with an <introduction>.

(a) Then we can ask students to do some <task>s.

(b) Here's a second <task>.

## **Zeroes of Polynomial Functions (PR4)**

### **1.4 Zeroes of Polynomial Functions (PR4)**

#### **Objectives**

- Determine the zeros of a real polynomial function, write a polynomial function given information about its zeros and their multiplicities, and apply the Factor Theorem and the Fundamental Theorem of Algebra.

## Zeroes of Polynomial Functions (PR4)

**Activity 1.4.1** Activities may start with an <introduction>.

(a) Then we can ask students to do some <task>s.

(b) Here's a second <task>.

## **1.5 Graphs of Polynomial Functions (PR5)**

### **Objectives**

- Find the intercepts, estimated locations of maxima and minima, and end behavior of a polynomial function, and use this information to sketch the graph.

## Graphs of Polynomial Functions (PR5)

**Activity 1.5.1** Activities may start with an <introduction>.

(a) Then we can ask students to do some <task>s.

(b) Here's a second <task>.

## 1.6 Properties of Graphs of Rational Functions (PR6)

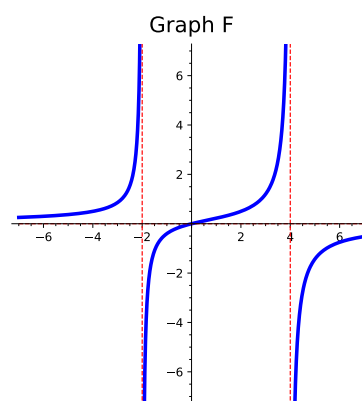
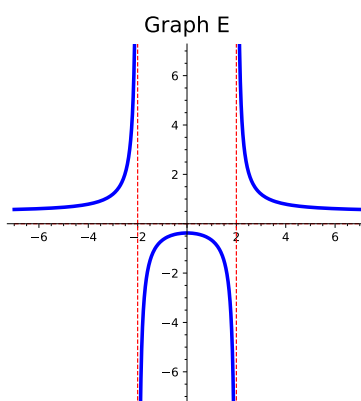
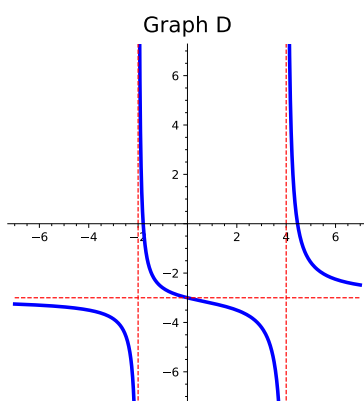
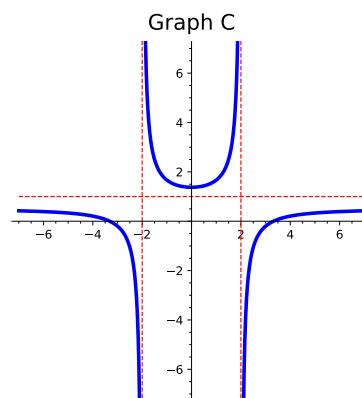
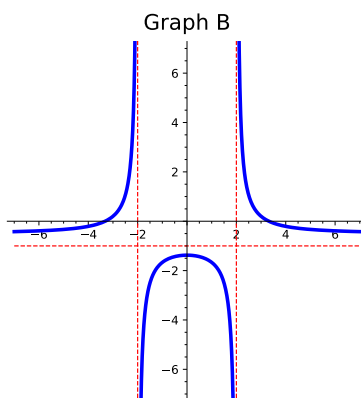
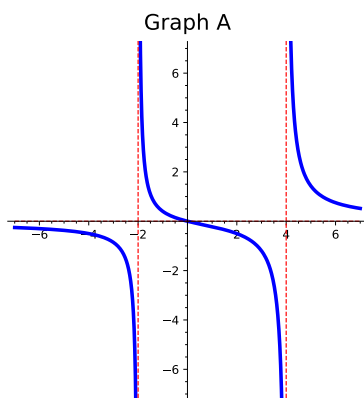
### Objectives

- Find the domain and range, vertical and horizontal asymptotes, and intercepts of a rational function and use this information to sketch the graph.



## Properties of Graphs of Rational Functions (PR6)

**Activity 1.6.1** Consider the following six graphs of rational functions:



(a) Which of the graphs above represents the function  $f(x) = \frac{2x}{x^2-2x-8}$ ?

(b) Which of the graphs above represents the function  $g(x) = \frac{x^2+3}{2x^2-8}$ ?

## **Colophon**

This book was authored in PreTeXt.