The Domain of a Function

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1 Administrivia

Announcements

Collect homework.

Read 2.5. Online quiz.

Homework due Monday. Pp. 69–72: 4 b, d, f; 7; 12; 15 a, c.

From Last Time

Toolkit functions class practice.

2 Introduction

1. Recall: What is the domain of a function?

2. Why aren’t all functions defined on (−∞, ∞)?
   (Which interval-type is that? Meaning?)

3. Why would we care? (Suppose we wanted to model a situation, but the model’s domain didn’t include some values we were interested in.)
An example: Your subordinate tells you that he modeled the historical price of widgets using the equation

\[ P = \sqrt{Y - 1990} \]

What was the price of widgets in 1983?

4. The two toolkit functions to watch out for:

- \( f(x) = \frac{1}{x} \)
- \( f(x) = \sqrt{x} \)

Domains?

Variations on the theme: How do each of these generalize? (Examples: \( \frac{1}{x^2 - x - 6} \), \( \sqrt{-3x + 2} \).)

5. Nasty combinations:

\[ f(x) = \sqrt{\frac{x^2 + 2x - 15}{x + 2}} \]

Strategy for dealing with these:

(a) If necessary, factor any polynomials.

(b) Find zeroes and points of discontinuity. Use these to break the number line into regions.

Zeroes as crossings and “touchings.”

(c) If any zeroes correspond to denominator terms, those x-values are excluded from the domain.

(d) For each of the regions you defined in step 2, determine the sign of any expression under a square root.

(e) If any expressions under square root have negative values, exclude those regions for which the sign is negative.

Another example:

\[ y = \sqrt{\frac{x^2 + 4x + 4}{x - 1}} \]
6. Review factoring on your own or use the method of completing the square. See course home page for online materials.

If you need practice in this area, complete the online readings. If you need further help after completing the readings, make an appointment to see me outside of class.

3 Class Problems

Pg. 77: 1 a, b, g, h, i.