Section 8.8 Graphing Rational Functions by Transformations

Before Class:

☐ Read the objectives on page 550.

☐ Read the Helpful Hint box on page 550.

☐ Complete the exercises:

1. A(n) __________________________ is a line that a graph approaches.

2. Rational functions are quotients of __________________________.

3. To graph a rational function using a graphing utility, for best results use __________________________ mode.

During Class:

☐ Write your class notes. Neatly write down all examples shown as well as key terms or phrases with definitions. If not applicable or if you were absent, watch the Lecture Series (DVD) for this section and do the same (write down the examples shown as well as key terms or phrases). Insert more paper as needed.

<table>
<thead>
<tr>
<th>Class Notes/Examples</th>
<th>Your Notes</th>
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</table>

Answers: 1) asymptote  2) polynomial functions  3) dot
<table>
<thead>
<tr>
<th>Class Notes (continued)</th>
<th>Your Notes</th>
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(Insert additional paper as needed.)
Section 8.8 Graphing Rational Functions by Transformations

Practice:

☐ Complete any incomplete exercises below. Check and correct your work using the answers and references at the end of this section.

Review this example:
1. Find the domain of the rational function

\[ h(x) = \frac{x + 3}{x^2 + 9}. \]

No real numbers cause the denominator of \( h(x) = \frac{x + 3}{x^2 + 9} \) to equal 0. The domain of \( h \) consists of all real numbers.

Review this example:
3. Use the graph of \( f(x) = \frac{1}{x^2} \) to graph

\[ g(x) = \frac{1}{(x - 2)^2} + 1. \]

Compare the given \( g(x) \) to \( f(x) = \frac{a}{(x - h)^2} + k \).

We see that \( h \) is 2 and \( k \) is 1.

- Draw a dashed vertical asymptote at \( x = 2 \).
- Draw a dashed horizontal asymptote at \( y = 1 \).
- A few ordered-pair solutions are shown along with the graph of \( g(x) \).

Your turn:
2. Find the domain of the rational function \( h(x) = \frac{x + 7}{x^2 - 49} \).

Your turn:
4. Use transformations of \( f(x) = \frac{1}{x} \) to graph the rational function \( g(x) = \frac{1}{x - 1} \).
Review this example:

5. Use the graph of \( f(x) = \frac{1}{x} \) to graph

\[ g(x) = \frac{1}{x + 1} - 2. \]

Compare the given \( g(x) \) to \( f(x) = \frac{a}{x - h} + k \).

Since \( g(x) = \frac{1}{x - (-1)} + (-2) \), we have that \( h \) is \(-1\) and \( k \) is \(-2\).

- Draw a dashed vertical asymptote at \( x = -1 \).
- Draw a dashed horizontal asymptote at \( y = -2 \).
- A few ordered-pair solutions are shown along with the graph of \( g(x) \).

Your turn:

6. Use transformations of \( f(x) = \frac{1}{x^2} \) to graph the rational function

\[ h(x) = \frac{1}{x^2} - 4. \]
### Section 8.8 Graphing Rational Functions by Transformations

<table>
<thead>
<tr>
<th>Answer</th>
<th>Text Ref</th>
<th>Video Ref</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>all real numbers</td>
<td>Ex 1c, p. 550</td>
</tr>
<tr>
<td>2</td>
<td>all real numbers except $-7$ and $7$</td>
<td>Sec 8.8, Ex 5</td>
</tr>
<tr>
<td>3</td>
<td>$g(x) = \frac{1}{x-1}$</td>
<td>Sec 8.8, Ex 9</td>
</tr>
<tr>
<td>4</td>
<td>$h(x) = \frac{1}{x^2 - 4}$</td>
<td>Sec 8.8, Ex 17</td>
</tr>
</tbody>
</table>

☐ **Next, insert your homework.** Make sure you attempt all exercises asked of you and show all work, as in the exercises above. Check your answers if possible. Clearly mark any exercises you were unable to correctly complete so that you may ask questions later. **DO NOT ERASE YOUR INCORRECT WORK. THIS IS HOW WE UNDERSTAND AND EXPLAIN TO YOU YOUR ERRORS.**
Preparing for the Chapter 8 Test

Start preparing for your Chapter 8 Test as soon as possible. Pay careful attention to any instructor discussion about this test, especially discussion on what sections you will be responsible for, etc.

☐ Work the Chapter 8 Vocabulary Check on page 554.

☐ Read your Class Notes/Examples for each section covered on your Chapter 8 Test. Look for any unresolved questions you may have.

☐ Complete as many of the Chapter 8 Review exercises as possible (page 555). Remember, the odd answers are in the back of your text.

☐ **Most important:** Place yourself in “test” conditions (see below) and work the Chapter 8 Test (page 557) as a practice test the day before your actual test. To honestly assess how you are doing, try the following:
  - Work on a few blank sheets of paper.
  - Give yourself the same amount of time you will be given for your actual test.
  - Complete this Chapter 8 Practice Test without using your notes or your text.
  - If you have any time left after completing this practice test, check your work and try to find any errors on your own.
  - Once done, use the back of your book to check ALL answers.
  - Try to correct any errors on your own.
  - Use the Chapter Test Prep Video (CTPV) to correct any errors you were unable to correct on your own. You can find these videos in the Interactive DVD Lecture Series, in MyMathLab, and on YouTube. Search Martin-Gay MyMathLab Algebra I and click “Channels.”

I wish you the best of luck….Elayn Martin-Gay