

# Week 10 Activities & Exercises

1. Find the domain of the following functions by graphing the denominator.

$$(a) f(x) = \frac{3x^3 - 2x^2 + 4}{x^2 + 5x - 14}$$

$$(b) f(x) = \frac{-7x + 4}{x^2 + 7x + 10}$$

$$(c) f(x) = \frac{x^2 + 4}{x^3 + 4x^2 - 11x - 30}$$

2. Find the vertical asymptotes of the following functions by graphing the function along with its denominator.

$$(a) f(x) = \frac{x^2 + 6x + 8}{x^2 + 2x - 15}$$

$$(b) f(x) = \frac{x^2 + 2x - 8}{x^3 + 6x^2 - 9x - 14}$$

$$(c) f(x) = \frac{x^2 + 2x - 8}{x^3 + 3x^2 - 6x - 8}$$

3. Write the numerator and denominator of the following functions in factored form to find the vertical asymptotes and the holes. Remember that you can use the graphs of the numerator and denominator to help factor them. Compare your answers here to the last question.

$$(a) f(x) = \frac{x^2 + 6x + 8}{x^2 + 2x - 15}$$

$$(b) f(x) = \frac{x^2 + 2x - 8}{x^3 + 6x^2 - 9x - 14}$$

$$(c) f(x) = \frac{x^2 + 2x - 8}{x^3 + 3x^2 - 6x - 8}$$

4. Use a table to find the horizontal asymptotes of the following functions. If the function does not have a horizontal asymptote state why.

$$(a) f(x) = \frac{3x^2 + 5x - 7}{2x^2 + x - 1}$$

$$(b) f(x) = \frac{x^2 + 2x - 8}{x^3 + 6x^2 - 9x - 14}$$

$$(c) f(x) = \frac{x^3 + 2}{3x^2 - 6x - 8}$$

5. Use the graphs of the following functions to find the horizontal asymptotes. If the function does not have a horizontal asymptote state why. Compare your answers here with the previous exercise.

(a)  $f(x) = \frac{3x^2 + 5x - 7}{2x^2 + x - 1}$

(b)  $f(x) = \frac{x^2 + 2x - 8}{x^3 + 6x^2 - 9x - 14}$

(c)  $f(x) = \frac{x^3 + 2}{3x^2 - 6x - 8}$

6. Use the “rules” outlined on page 124 to find the horizontal asymptotes of the following functions. If the function does not have a horizontal asymptote state why. Compare your answers here with the previous exercises.

(a)  $f(x) = \frac{3x^2 + 5x - 7}{2x^2 + x - 1}$

(b)  $f(x) = \frac{x^2 + 2x - 8}{x^3 + 6x^2 - 9x - 14}$

(c)  $f(x) = \frac{x^3 + 2}{3x^2 - 6x - 8}$

7. Use the graphical method (like pages 128–130) to find the quotient of the following divisions.

(a)  $f(x) = \frac{x^3 + 6x^2 + 16x + 14}{x^2 + 3x + 5}$

(b)  $f(x) = \frac{2x^3 - 5x^2 - 13x + 20}{x^2 + x - 3}$

(c)  $f(x) = \frac{x^5 - 2x^2 + x^4 - 10x + 9}{x^3 + 2 * x - 5}$

8. Use long division to find the quotient of the following divisions. Compare your answers here with the previous exercise.

(a)  $f(x) = \frac{x^3 + 6x^2 + 16x + 14}{x^2 + 3x + 5}$

(b)  $f(x) = \frac{2x^3 - 5x^2 - 13x + 20}{x^2 + x - 3}$

(c)  $f(x) = \frac{x^5 - 2x^2 + x^4 - 10x + 9}{x^3 + 2 * x - 5}$

9. Do Exercise 2.3.4 from the text (page 122).  
10. Do Exercise 2.3.5 from the text (page 122).  
11. Do Exercise 2.3.6 from the text (page 122).