Name _____ Class _____ Date _____

Practice 9-3

Rational Functions and Their Graphs

Find any points of discontinuity for each rational function.

1. $y = \dfrac{x + 3}{(x - 4)(x + 3)}$ **2.** $y = \dfrac{x - 2}{x^2 - 4}$ **3.** $y = \dfrac{(x - 3)(x + 1)}{(x - 2)}$

4. $y = \dfrac{3x(x + 2)}{x(x + 2)}$ **5.** $y = \dfrac{2}{(x + 1)}$ **6.** $y = \dfrac{4x}{x^3 - 9x}$

Find the horizontal asymptote of the graph of each rational function.

7. $y = \dfrac{2}{x - 6}$ **8.** $y = \dfrac{x + 2}{x - 4}$ **9.** $y = \dfrac{(x + 3)}{2(x + 4)}$

10. $y = \dfrac{2x^2 + 3}{x^2 - 6}$ **11.** $y = \dfrac{3x - 12}{x^2 - 2}$ **12.** $y = \dfrac{3x^3 - 4x + 2}{2x^3 + 3}$

Sketch the graph of each rational function.

13. $y = \dfrac{3}{x - 2}$ **14.** $y = \dfrac{3}{(x - 2)(x + 2)}$ **15.** $y = \dfrac{x}{x(x - 6)}$

16. $y = \dfrac{2x}{x - 6}$ **17.** $y = \dfrac{x^2 - 1}{x^2 - 4}$ **18.** $y = \dfrac{2x^2 + 10x + 12}{x^2 - 9}$

19. $y = \dfrac{x}{x^2 + 4}$ **20.** $y = \dfrac{x + 2}{x - 1}$ **21.** $y = \dfrac{x + 3}{x + 1}$

Describe the vertical asymptotes and holes for the graph of each rational function.

22. $y = \dfrac{x - 2}{(x + 2)(x - 2)}$ **23.** $y = -\dfrac{x}{x(x - 1)}$ **24.** $y = \dfrac{5 - x}{x^2 - 1}$

25. $y = \dfrac{x^2 - 2}{x + 2}$ **26.** $y = \dfrac{x^2 - 4}{x^2 + 4}$ **27.** $y = \dfrac{x + 3}{x^2 - 9}$

28. $y = \dfrac{x^2 - 25}{x - 4}$ **29.** $y = \dfrac{(x - 2)(2x + 3)}{(5x + 4)(x - 3)}$ **30.** $y = \dfrac{15x^2 - 7x - 2}{x^2 - 4}$

31. Suppose you start a home business typing technical research papers for college students. You must spend $3500 to replace your computer system. Then you estimate the cost of typing each page will be $.02.

a. Write a rational function modeling your average cost per page. Graph the function.

b. How many pages must you type to bring your average cost per page to less than $1.50 per page, the amount you plan to charge?

c. How many pages must you type to have the average cost per page equal $1.00?

d. How many pages must you type to have the average cost per page equal $.50?

e. What are the vertical and horizontal asymptotes of the graph of the function?