

LESSON 7.4 Skills Practice

Name _____ Date _____

There's a Hole In My Function, Dear Liza
Graphical Discontinuities
Vocabulary

Write a definition for the term in your own words.

- removable discontinuity

Problem Set

 Determine which function, $f(x)$ or $g(x)$, has a removable discontinuity without using your graphing calculator. Identify the removable discontinuity.

- $f(x) = \frac{1}{x-2}$

$$g(x) = \frac{x+4}{(x-3)(x+4)}$$

The function $g(x)$ has a removable discontinuity at $x = -4$.

- $f(x) = \frac{1}{x(x+6)}$

$$g(x) = \frac{x(x+1)}{x}$$

- $f(x) = \frac{x+2}{(x+2)^2}$

$$g(x) = (x-3)(x+7)$$

- $f(x) = \frac{x^3}{x}$

$$g(x) = \frac{2}{x}$$

- $f(x) = \frac{x+1}{x-3}$

$$g(x) = \frac{(x+4)(x+7)}{(x-2)(x-1)(x+7)}$$

- $f(x) = \frac{x^2(x-1)}{x(x-3)}$

$$g(x) = \frac{x}{(x-1)}$$

LESSON 7.4 Skills Practice

page 2

Simplify each rational expression. List any restrictions on the domain.

$$7. \frac{3x - 9}{x - 3}$$

$$\frac{3x - 9}{x - 3} = \frac{3(x - 3)}{x - 3}$$

$$= 3; x \neq 3$$

$$8. \frac{2xy - 2y}{x - 1}$$

$$9. \frac{x^2 - 1}{x - 1}$$

$$10. \frac{x - 5}{x^2 - 25}$$

$$11. \frac{x^2 + x - 20}{x + 5}$$

$$12. \frac{x^2 + 5x - 14}{x^2 + 8x + 7}$$

$$13. \frac{x^2 - 1}{x - 1}$$

$$14. \frac{x^2 - 2x - 8}{x^2 + 8x + 15}$$

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LESSON 7.4 Skills Practice

page 3

Name _____ Date _____

Determine whether the graph of each rational function has a vertical asymptote, a removable discontinuity, both, or neither. List the discontinuities, if any exist.

15. $f(x) = \frac{x(x+3)}{x+3}$

The function $f(x)$ has a removable discontinuity at $x = -3$.

16. $f(x) = \frac{2x}{x-7}$

17. $f(x) = \frac{x-5}{10}$

18. $f(x) = \frac{x-4}{(x-2)(x-4)}$

19. $f(x) = \frac{x^2-3x}{x^2-9}$

20. $f(x) = \frac{x+2}{x^2-6x-16}$

LESSON 7.4 Skills Practice

page 4

21. $f(x) = \frac{x^3 - x^2 + x - 1}{x - 1}$

22. $f(x) = \frac{x^2 + 2}{x^4 + 2x^2}$

Write an example of a rational function that models each of the given characteristics.

23. A vertical asymptote at
- $x = -7$
- .

Answers will vary.

$$f(x) = \frac{1}{x + 7}$$

24. A removable discontinuity at
- $x = 8$
- .

25. A vertical asymptote at
- $x = 0$
- .

26. A vertical asymptote at
- $x = -3$
- and
- $x = 5$
- .

27. A vertical asymptote at
- $x = 3$
- .

28. No vertical asymptote.

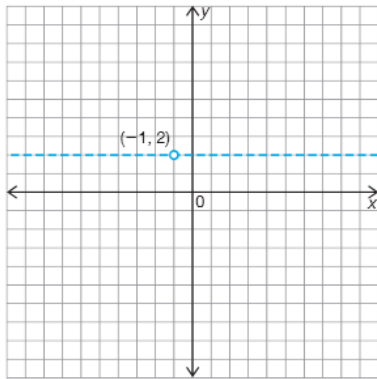
LESSON 7.4 Skills Practice

page 5

Name _____ Date _____

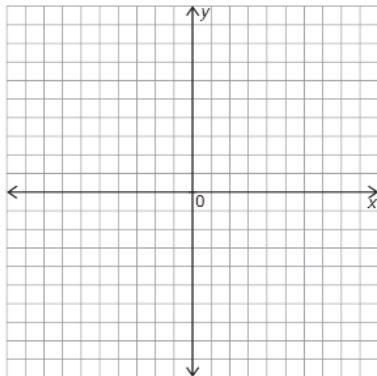
Sketch each rational function without using a graphing calculator. Identify any restrictions.

29. $f(x) = \frac{2x + 2}{x + 1}$



$$\begin{aligned} f(x) &= \frac{2x + 2}{x + 1} \\ &= \frac{2(x + 1)}{x + 1} \\ &= 2; x \neq -1 \end{aligned}$$

30. $f(x) = \frac{x}{x^2 - 4x}$

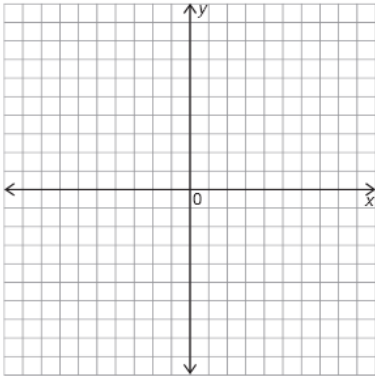


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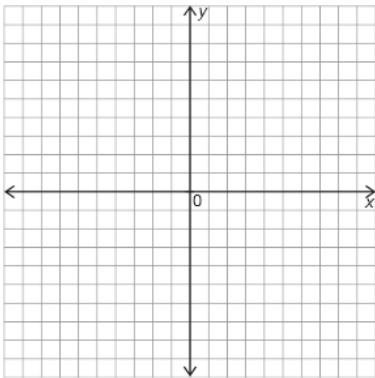
LESSON 7.4 Skills Practice

page 6

31. $f(x) = \frac{x + 3}{x^2 + 7x + 12}$



32. $f(x) = \frac{x^2 - 3x - 10}{x - 5}$



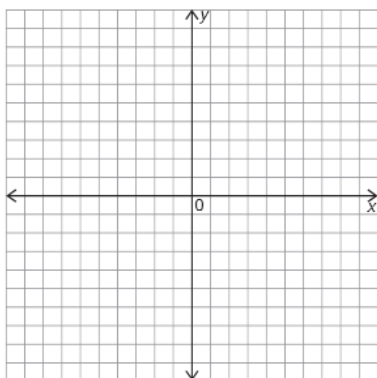
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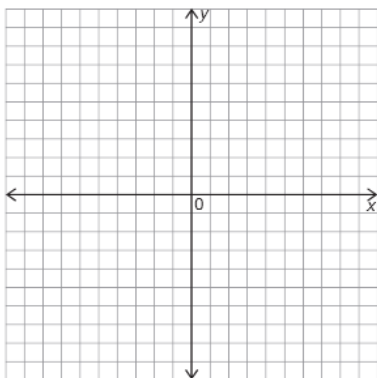
page 7

Name _____ Date _____

33. $f(x) = \frac{x^2 - 5x - 14}{x^2 - 5x - 14}$



34. $f(x) = \frac{x^2 - 5x - 6}{x - 6}$

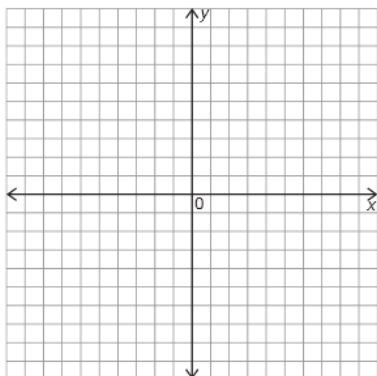


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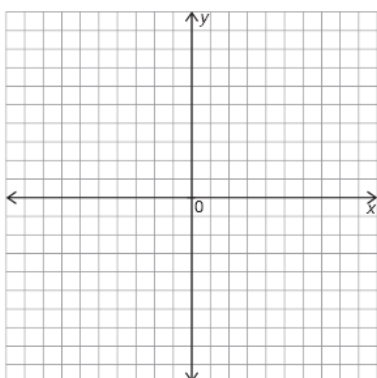
LESSON 7.4 Skills Practice

page 8

35. $f(x) = \frac{4 - x^2}{x^2 - 4}$



36. $f(x) = \frac{x^2 - 7x - 6}{x + 1}$



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