

Unit 3 Rational Functions

Multiple Choice - Identify the choice that best completes the statement or answers the question.

- _____ 1. Find the y-intercept and asymptotes of the rational function $r(x) = \frac{x^2 - 5x - 50}{(x - 5)^2}$.
- | | | | |
|----|------------------------|---|--------------------------------|
| a. | y-intercept
(0, -2) | horizontal asymptote
$y = 1$ | vertical asymptote
$x = 5$ |
| b. | y-intercept
(0, 2) | horizontal asymptote
$y = 1$ | vertical asymptote
$x = -5$ |
| c. | y-intercept
(0, -2) | horizontal asymptote
<i>Does Not Exist</i> | vertical asymptote
$x = -5$ |
| d. | y-intercept
(0, 5) | horizontal asymptote
$y = 0$ | vertical asymptote
$x = 25$ |
| e. | y-intercept
(0, 10) | horizontal asymptote
$y = 0$ | vertical asymptote
$x = 5$ |

Short Answer

2. Find the zero(s), y- intercept, and asymptotes of the rational function $r(x) = \frac{5x + 120}{-4x + 8}$.
3. Find the x- and y-intercepts of the rational function $r(x) = \frac{x - 18}{x + 6}$.

Determine the equations of any vertical asymptotes and the values of x for any holes in the graph of the rational function.

4. $f(x) = \frac{3}{x^2 - 14x + 48}$

Determine the equations of any vertical asymptotes and the values of x for any holes in the graph of the rational function.

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

6. Describe the vertical asymptote(s) and hole(s) for the graph of $y = \frac{(x - 5)(x - 2)}{(x - 2)(x + 4)}$.

7. Find the horizontal asymptote of the graph of $y = \frac{-9x^3 - 6x + 4}{-9x^5 + 6x + 4}$.

8. Find the horizontal asymptote of the graph of $y = \frac{6x^2 + 5x + 9}{7x^2 - x + 9}$.

9. Find all horizontal and vertical asymptotes (if any).

$$r(x) = \frac{2x - 4}{x^2 + 10x + 25}$$

- (a) Find all horizontal asymptotes (if any).
- (b) Find all vertical asymptotes (if any).
- (c) Find all holes (if any).

10. Find the intercepts and asymptotes.

$$s(x) = \frac{5x - 5}{(x - 5)(x + 1)}$$

- (a) Determine the zero(s).
- (b) Determine the y-intercept(s).
- (c) Determine the vertical asymptote(s).
- (d) Determine the horizontal asymptote(s).
- (e) Determine the holes(s).
- (f) State the domain.

Unit 3 Rational Functions

Answer Section

MULTIPLE CHOICE

1. D

SHORT ANSWER

2.

zero	y-int.	horiz. asymptote	vert. asymptote
$x = -24$	$(0, 15)$	$y = -1.25$	$x = 2$

3. x-intercept $(18, 0)$, y-intercept $(0, -3)$

4. asymptotes: $x = 6$; $x = 8$, no holes

NOTE: If the rational expression of a function is written in simplest form and the function is undefined for $x = a$, then $x = a$ is a vertical asymptote.

5. asymptotes: $x = 1$; hole: $x = 6$

NOTE: If the rational expression of a function is written in the simplest form and the function is undefined for $x = a$, then $x = a$ is a vertical asymptote. If the function is defined for $x = a$, then there is a hole in the graph at $x = a$.

6. asymptote: $x = -4$ and hole: $x = 2$

7. $y = 0$

8. $y = \frac{6}{7}$

9. (A) $y = 0$
(B) $x = -5$
(C) *No holes*

10. (A) $x = 1$
(B) $(0, 1)$
(C) $x = -1, x = 5$
(D) $y = 0$
(E) *No holes*
(F) $(-\infty, -1) \cup (-1, 5) \cup (5, \infty)$