27 Properties of Rational Functions

Due:
12/14/2015 at 06:00am EST.

Students will be able to:
• Identify domain of rational functions
• Identify vertical asymptotes of rational functions
• Identify horizontal or slanted asymptotes of rational functions
• Identify any holes a graph of rational function might have
• Find the x-intercepts and y-intercepts of a graph of rational function

Functions and symbols that WeBWorK understands.

Links to some useful WeBWorK pages for students

1. (1 pt) Consider the function
   \[ f(x) = \frac{-4}{4x - 3} \]

   Find the vertical asymptote(s). If there is more than one vertical asymptote give a list of the x-values separated by commas.
   \[ x = \quad \]

   If this function has a horizontal asymptote, give its y-value. If there is no horizontal asymptote, type in none.

2. (1 pt) Consider the function
   \[ f(x) = \frac{-4x + 8}{9x + 7} \]

   Enter the equations of the vertical asymptotes. If there are no vertical asymptotes, enter none. If there is more than one vertical asymptote, enter a list of the equations separated by a comma (e.g., x=20, x=-7).

   Vertical asymptotes: 

   Enter the equations of the horizontal asymptotes. If there are no horizontal asymptotes, enter none. If there is more than one horizontal asymptote, enter a list of the equations separated by a comma (e.g., y=20, y=-7).

   Horizontal asymptotes: 

  Find the x-intercept(s). If there is more than one x-intercept give a list of the x-intercepts separated by commas (i.e.: (1,2),(3,4)). If there is no x-intercept type in none.
   \[ x = \quad \]

  Find the y-intercept:

  Find the domain of \( f(x) \):

   Give your answer in interval notation.

3. (1 pt) Consider the function
   \[ f(x) = \frac{8x - 7}{x^2 + 3x - 10} \]

   Find the vertical asymptote(s). If there is more than one vertical asymptote give a list of the x-values separated by commas.
   \[ x = \quad \]

   If this function has a horizontal asymptote, give its y-value. If there is no horizontal asymptote, type in none.

   Find the x-intercept(s). If there is more than one x-intercept give a list of the x-values separated by commas.
   \[ x = \quad \]

   Find the y-intercept

   Find the domain of \( f(x) \):

4. (1 pt) Consider the function
   \[ f(x) = \frac{x^2 - 4x - 32}{x^2 + 7x} \]

   Find the vertical asymptote(s). If there is more than one vertical asymptote give a list of the x-values separated by commas.
   \[ x = \quad \]

   If this function has a horizontal asymptote, give its y-value. If there is no horizontal asymptote, type in none.

   Find the x-intercept(s). If there is more than one x-intercept give a list of the x-values separated by commas.
   \[ x = \quad \]

   Find the y-intercept. If there is no y-intercept type in None.
   \[ y = \quad \]
5. (1 pt) Consider the function
\[ f(x) = \frac{2x + 4}{(8x + 5)(7x + 10)} \]
Enter the equations of the vertical asymptotes. If there are no vertical asymptotes, enter none . If there is more than one vertical asymptote, enter a list of the equations separated by a comma (e.g., x=20, x=-7).
Vertical asymptotes: ________________

Enter the equations of the horizontal asymptotes. If there are no horizontal asymptotes, enter none . If there is more than one horizontal asymptote, enter a list of the equations separated by a comma (e.g., y=20, y=-7).
Horizontal asymptotes: ________________

Find the x-intercept(s). If there is more than one x-intercept give a list of the x-intercepts separated by commas (i.e.: (1,2),(3,4)). If there is no x-intercept type in none .
X-intercepts: ________________

Find the y-intercept: ________________

Find the domain of \( f(x) \):
Give your answer in interval notation.

6. (1 pt) Consider the function
\[ f(x) = \frac{x - 5}{(-2x + 7)(5x + 2)} \]
Enter the equations of the vertical asymptotes. If there are no vertical asymptotes, enter none . If there is more than one vertical asymptote, enter a list of the equations separated by a comma (e.g., x=20, x=-7).
Vertical asymptotes: ________________

Enter the equations of the horizontal asymptotes. If there are no horizontal asymptotes, enter none . If there is more than one horizontal asymptote, enter a list of the equations separated by a comma (e.g., y=20, y=-7).
Horizontal asymptotes: ________________

Find the domain of \( f(x) \):
Give your answer in interval notation.

7. (1 pt) Consider the function
\[ f(x) = \frac{(-6x + 5)(9x + 3)}{(5x - 9)(x + 9)} \]
Enter the equations of the vertical asymptotes. If there are no vertical asymptotes, enter none . If there is more than one vertical asymptote, enter a list of the equations separated by a comma (e.g., x=20, x=-7).
Vertical asymptotes: ________________

Enter the equations of the horizontal asymptotes. If there are no horizontal asymptotes, enter none . If there is more than one horizontal asymptote, enter a list of the equations separated by a comma (e.g., y=20, y=-7).
Horizontal asymptotes: ________________

Find the x-intercept(s). If there is more than one x-intercept give a list of the x-intercepts separated by commas (i.e.: (1,2),(3,4)). If there is no x-intercept type in none .
X-intercepts: ________________

Find the y-intercept: ________________

Find the domain of \( f(x) \):
Give your answer in interval notation.

8. (1 pt) Consider the function
\[ f(x) = \frac{x^2 + 4x - 45}{x - 5} \]
Find the vertical asymptote(s). If there is more than one vertical asymptote give a list of the x-values separated by commas. If there is no vertical asymptote, type in None .
X = ________________

If this function has a horizontal asymptote, give its y-value. If there is no horizontal asymptote, type in None .

Find the x- intercept(s). If there is more than one x-intercept give a list of the x-values separated by commas.
X = ________________

Find the y-intercept
Y = ________________
9. (1 pt) Consider the function 

\[ f(x) = \frac{x^2 - 16}{x^2 - 25} \]

Find the vertical asymptote(s). If there is more than one vertical asymptote give a list of the x-values separated by commas.

\[ x = \] ________

If this function has a horizontal asymptote, give its y-value. If there is no horizontal asymptote, type in None.

Find the y-intercept

______

Find the domain. Write a comma separated list of all the x-values that are not in the domain. If there are no such x, type none in the answer blank.

\[ x \neq \] ________

10. (1 pt) Consider the function 

\[ f(x) = \frac{(7x - 1)(-x - 4)}{(x + 7)(7x - 1)} \]

What is the vertical asymptote that is furthest left?

\[ x = \] ________

What is the vertical asymptote that is furthest right?

\[ x = \] ________

What is the horizontal asymptote?

\[ y = \] ________

11. (1 pt) For the function

\[ f(x) = \frac{x - 6}{(-2x + 3)(5x + 3)} \]

What are the vertical asymptotes? Give a list of the x-values of the asymptotes separated by commas.

\[ x = \] ________

What is the horizontal asymptote?

\[ y = \] ________

12. (1 pt) Consider the function 

\[ f(x) = \frac{4x + 7}{(7x + 2)(4x + 1)} \]

Find the vertical asymptote(s). If there is more than one vertical asymptote give a list of the x-values separated by commas. If there are no vertical asymptotes, type in none.

\[ x = \] ________

If this function has a horizontal asymptote, give its y-value. If there is no horizontal asymptote, type in none.

\[ y = \] ________

Find the x-intercept(s). If there is more than one x-intercept give a list of the x-intercepts separated by commas (i.e.: (1,2), (3,4)). If there is no x-intercept type in none.

Find the y-intercept

______

13. (1 pt) For the function

\[ f(x) = \frac{(7x - 3)}{(-3x - 5)(4x - 3)} \]

What are the vertical asymptotes? Give a list of the x-values of the asymptotes separated by commas.

\[ x = \] ________

What is the horizontal asymptote?

\[ y = \] ________

What are the x-intercepts? Give a list of the x-intercepts separated by commas (i.e.: (1,2), (3,4)). If there are no x-intercepts, type in None.

x-intercepts: ________

What is the y-intercept?

y-intercept: ________

14. (1 pt) Consider the function

\[ f(x) = \frac{x^4 + 20}{x^2 - 4x + 7} \]

What are the vertical asymptotes? Give a list of the x-values of the asymptotes separated by commas. If there are none, enter None.

\[ x = \] ________

What is the horizontal asymptote? If there are none, enter None.

\[ y = \] ________

What are the x-intercepts? Give a list of the x-values of the x-intercepts separated by commas. If there are none, enter None.

\[ x = \] ________

What is the y-intercept? If there are none, enter None.

\[ y = \] ________
15. (1 pt) Let
\[ f(x) = \frac{8x^3 - 18x^2 - 207x + 162}{-4x^3 + 3x^2 + 196x - 147} \]

The domain of the function \( f(x) \) is: ____________
Use interval notation to enter your answer.

The root(s) of \( f(x) \) is/are: ____________

Enter the root(s) as a comma-separated list.
\( f(x) \) has one hole at the point: (____, ____).
\( f(x) \) has vertical asymptotes for the following \( x \) value(s): ____________.
Enter the asymptote(s) \( x \)-values as a comma-separated list.
\( f(x) \) has a horizontal asymptote at \( y = ____ \).