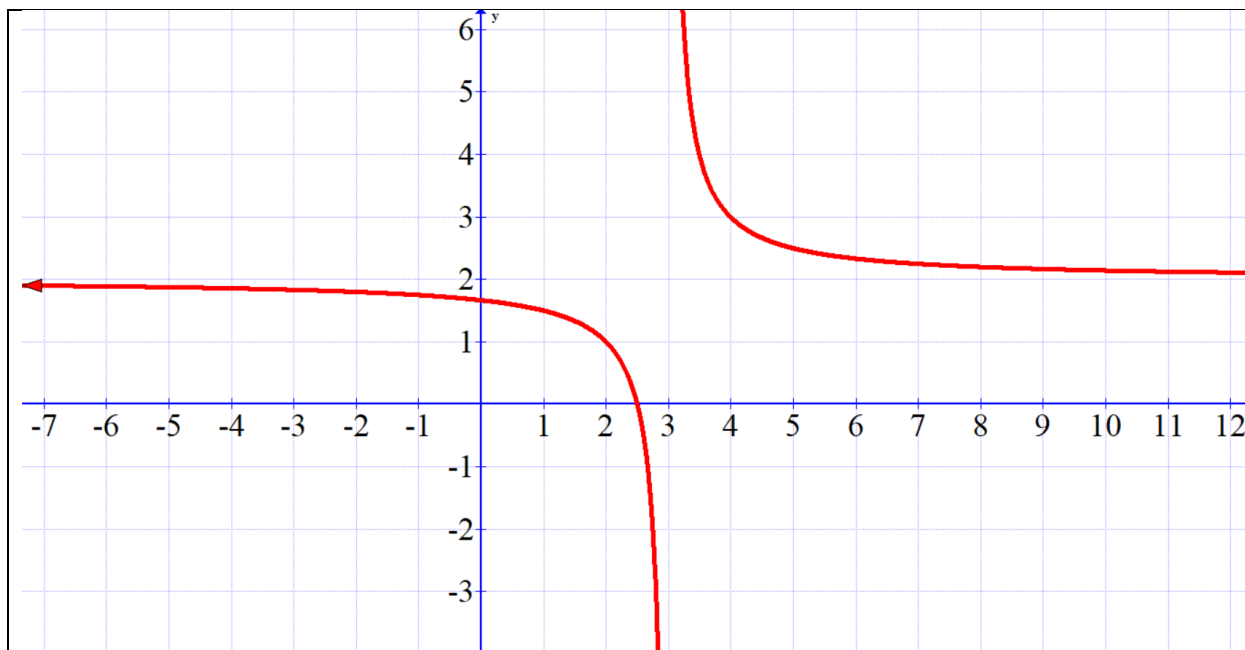<u>Asymptote Practice</u>

Use the following graph to answer the first question.

1. Which statement below is true?

    A) The equation of the vertical asymptote is x = 2 and the equation of the horizontal asymptote is y = 3.
    B) The equation of the vertical asymptote is x = 3 and the equation of the horizontal asymptote is y = 2.
    C) The equation of the vertical asymptote is x = 2 and there is no horizontal asymptote.
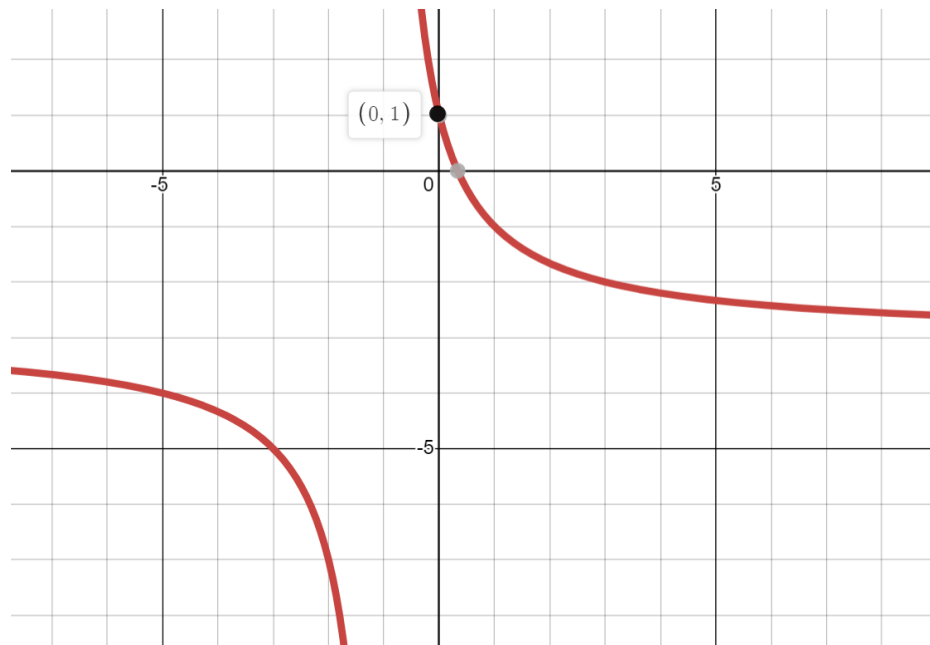   D) The equation of the vertical asymptote is x = 3 and there is no horizontal asymptote.

2. Given the equation $y = \frac{1}{x+8} + 5$, the domain is

    A) x ≠ -8   B) x ≠ 8   C) x ≠ -5   D) x ≠ 5

3. The range of $y = \frac{2}{x-10} + 9$ is y ≠ ___.

Use the following information to answer the next question.

The equation of the horizontal asymptote is y = -3 and the domain is x ≠ -1.
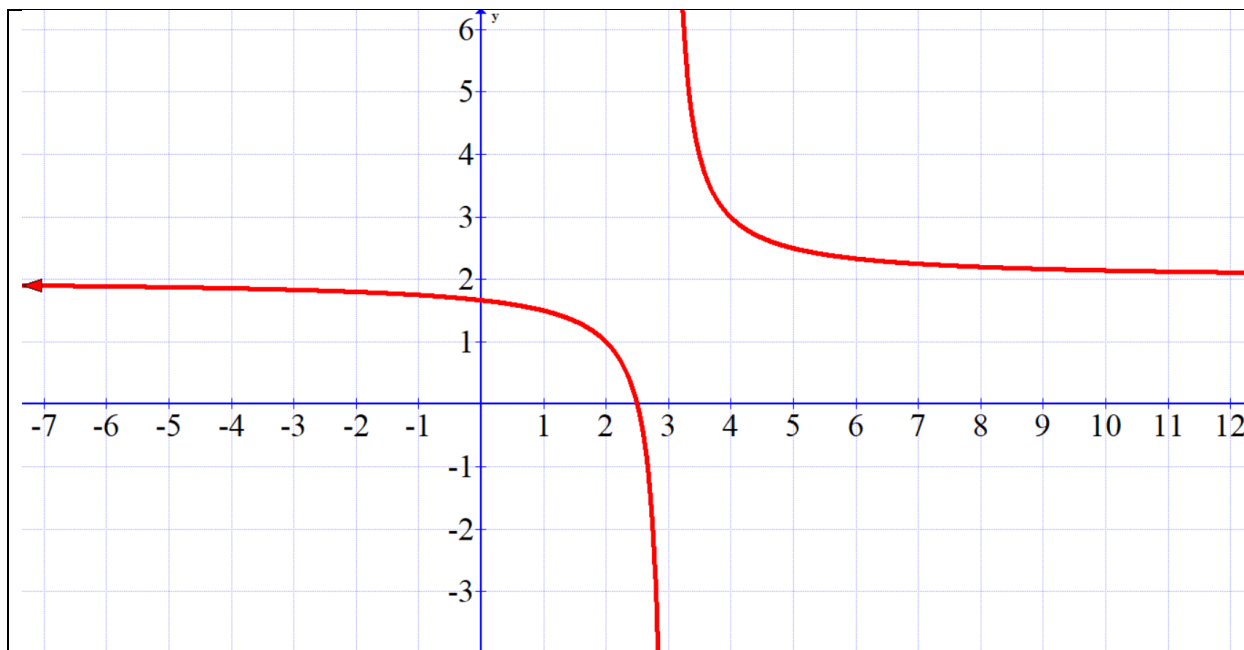

The point (0,1) lies on this graph, which can be written in the form $y = \dfrac{a}{x+p} - q$.

4. The value of *a* is ____.

5. The vertical and horizontal asymptotes of, $y = \dfrac{2}{x-7} + 4$, will intersect at the point

A) (7,4)   B) (4,7)   C) (-7, 4)   D) (7, -4)

6. Which of the following has a horizontal asymptote of y = 0 and a y-intercept of (0,-3)?

A) $y = \dfrac{-3}{x-1} + 1$

B) $y = \dfrac{2}{x-1} + 5$

C) $y = \dfrac{-6}{x+2}$

D) $y = \dfrac{-4}{x+2}$

Use the following graph to answer the first question.

1. Which statement below is true?

   A) The equation of the vertical asymptote is $x = 2$ and the equation of the horizontal asymptote is $y = 3$.
   B) The equation of the vertical asymptote is $x = 3$ and the equation of the horizontal asymptote is $y = 2$.
   C) The equation of the vertical asymptote is $x = 2$ and there is no horizontal asymptote.
   D) The equation of the vertical asymptote is $x = 3$ and there is no horizontal asymptote.

Solution

The vertical asymptote is the vertical line that the graph approaches but never touches. By looking at the graph, that line is $x = 3$.

The horizontal asymptote is the horizontal line that the graph approaches but never touches. By looking at the graph, that line is $y = 2$.

The correct answer is B.

2. Given the equation $y = \frac{1}{x+8} + 5$, the domain is

A) x ≠ -8   B) x ≠ 8   C) x ≠ -5   D) x ≠ 5

Solution

The domain is based on the expression in the denominator. Any value of the variable that makes the denominator equal to zero (because division by zero is undefined), will create the position of the asymptote.

If x = -8, the denominator will be undefined. Thus, the equation of the asymptote is x = -8. Since x can be any value but -8, the domain is x ≠ -8.

The correct answer is A.

3. The range of $y = \frac{2}{x-10} + 9$ is y ≠ _9_.

Solution

Given the base function, $y = \frac{1}{x}$, since there is no number added to or subtracted from this function, the equation of the horizontal asymptote is y = 0. This means that 'y' can be equal to any number but 0. Thus, the range is y ≠ 0.

Given, $y = \frac{2}{x-10} + 9$, the equation of the horizontal asymptote is y = 9. This means that 'y' can be equal to any number but 9. Thus, the range is y ≠ 9.

Use the following information to answer the next question.

The equation of the horizontal asymptote is y = -3 and the domain is x ≠ -1.
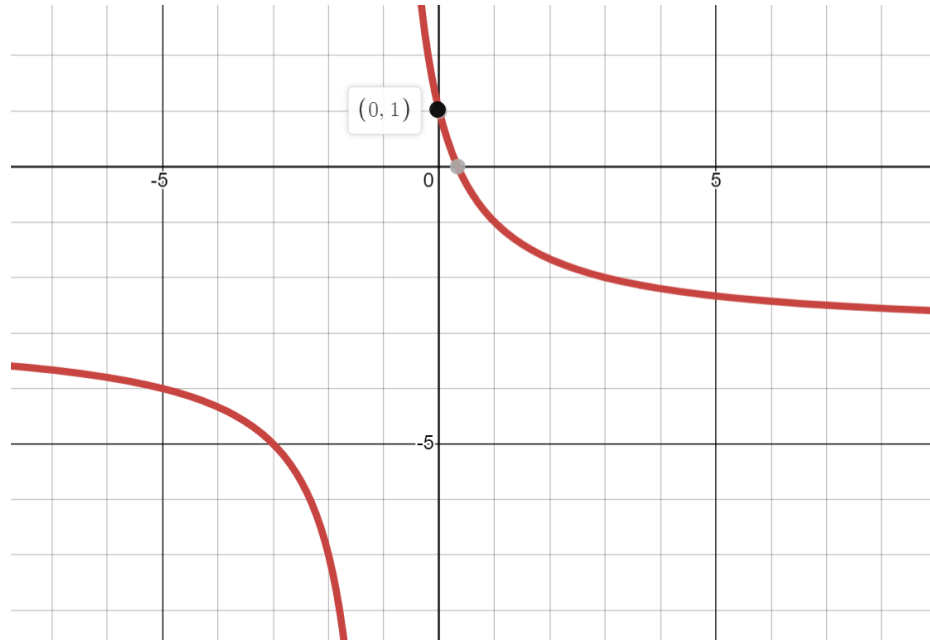
The point (0,1) lies on this graph, which can be written in the form $y = \dfrac{a}{x+p} - q$.

4. The value of *a* is __4__.

Solution

With a domain of x ≠ -1, we know that a vertical asymptote exists at x = -1. The value of 'p' in the equation is 1.

With an equation of the horizontal asymptote of y = -3, the value of 'q' is 3.

$y = \dfrac{a}{x+1} - 3.$

Substitute the given point on the graph (0,1) to determine the value of 'a'.

$(1) = \dfrac{a}{(0)+1} - 3.$

$4 = \dfrac{a}{1}$

5. The vertical and horizontal asymptotes of, $y = \frac{2}{x-7} + 4$, will intersect at the point

A) (7,4)   B) (4,7)   C) (-7, 4)   D) (7, -4)

Solution

The vertical asymptote is x = 7 and the horizontal asymptote is y = 4. These two lines will intersect at (7,4).

The correct answer is A.

6. Which of the following has a horizontal asymptote of y = 0 and a y-intercept of (0,-3)?

$A) \; y = \frac{-3}{x - 1} + 1$

$B) \; y = \frac{2}{x - 1} + 5$

$C) \; y = \frac{-6}{x + 2}$

$D) \; y = \frac{-4}{x + 2}$

Solution

When there is no number added to or subtracted from the function, as shown in options C and D, the equation of the horizontal asymptote is y = 0.

Since we know that the answer must be either C or D, substitute x = 0 to determine which equation will result in a y-intercept of -3.

$$y = \frac{-6}{(0) + 2} = \frac{-6}{2} = -3$$

The correct answer is C.