Topic: Infinite discontinuities

Question: Choose the correct statement.

Answer choices:

A An infinite discontinuity exists where the right- and left-hand limits both approach ∞, or both approach $-\infty$.

B An infinite discontinuity exists where the right-hand limit approaches $-\infty$ while the left-hand limit approaches ∞.

C An infinite discontinuity exists where the right-hand limit approaches ∞ while the left-hand limit approaches $-\infty$.

D All of the above are true.

Solution: D

In answer choices A, B, and C, both the left-hand limit and right-hand limit are tending toward an infinite value, whether that value is $-\infty$ or ∞.

Wherever both the left- and right-hand limit are approaching an infinite value, the function has a vertical asymptote, and therefore an infinite discontinuity.

Topic: Infinite discontinuities

Question: Choose the correct description of the infinite discontinuity.

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

Answer choices:

A The function has an infinite discontinuity at $x = 1$.

B The function has an infinite discontinuity at $x = -\infty$.

C The function has an infinite discontinuity at $x = 0$.

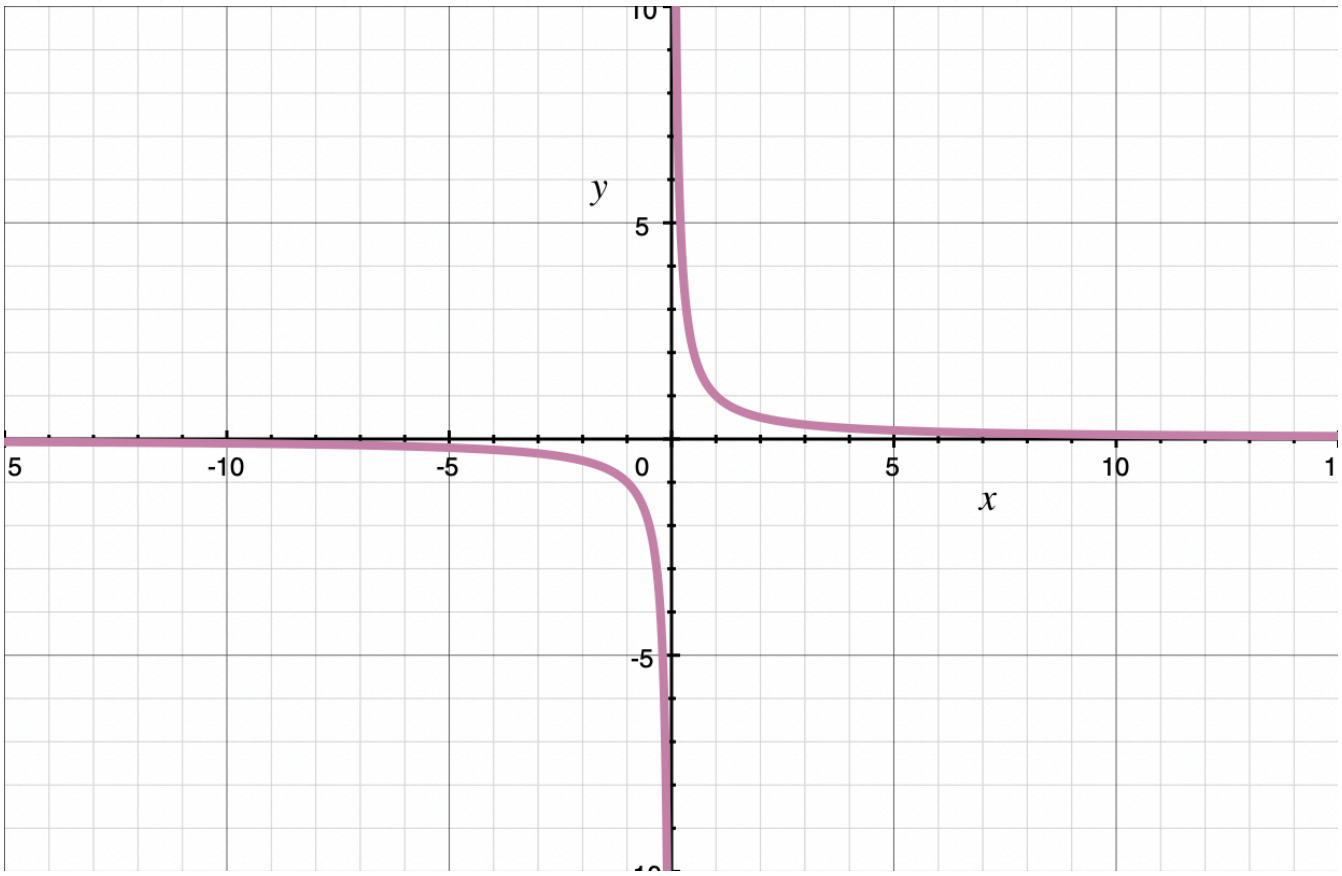
D The function has an infinite discontinuity at $x = \infty$.

Solution: C

The denominator of the function will be 0 when $x = 0$. That discontinuity can't be removed by canceling factors from the function, so $x = 0$ doesn't represent a point discontinuity.

Which means the function has a vertical asymptote, and therefore an infinite discontinuity, at $x = 0$.

The graph of the function confirms the discontinuity.



Topic: Infinite discontinuities

Question: Choose the correct description of the infinite discontinuity.

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

Answer choices:

A The function has an infinite discontinuity at $x = 4$.

B The function has an infinite discontinuity at $x = -\infty$.

C The function has an infinite discontinuity at $x = -4$.

D The function has an infinite discontinuity at $x = \infty$.

Solution: A

The denominator of the function will be 0 when $x = 4$. That discontinuity can't be removed by canceling factors from the function, so $x = 4$ doesn't represent a point discontinuity.

Which means the function has a vertical asymptote, and therefore an infinite discontinuity, at $x = 4$.

The graph of the function confirms the discontinuity.