Topic: Introduction to limits and continuity

Question: Which of the following is the correct mathematical way to write the limit of x as it approaches negative infinity of the given function?

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

Answer choices:

A $\lim_{x\to\infty} f(x) = \frac{x-6}{x}$

B $\lim_{x\to-\infty} f(x) = \frac{x-6}{x}$

C $\lim_{x\to-\infty} \frac{x-6}{x}$

D $\lim_{x\to\infty} \frac{x-6}{x}$

Solution: C

Limits are written as

$$\lim_{x \to a} f(x)$$

where a is the value that x is approaching and $f(x)$ is the given function.

To solve, we can see from the question that x approaches $-\infty$ so $a = -\infty$. The function given is

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

Which means that the limit is

$$\lim_{x \to -\infty} \frac{x-6}{x}$$

Topic: Introduction to limits and continuity

Question: Which of the following statements about the function is true?

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

Answer choices:

A The function is continuous at $x = 4$.

B The function is not continuous at $x = 4$.

C The function is not continuous at $x = -4$.

D The function is continuous at $x = -4$.

Solution: B

When assessing a function's continuity, it's important to look for places where the function will not exist. This happens when the function has a rational component and there could be a zero in the denominator, when there's a radical in the function that could have a negative number under it, or when there's a logarithmic argument that's equal to or less than zero.

The function

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

is a rational function which means that the denominator cannot equal zero. To find the hole in this function, set the denominator equal to zero and solve for x.

$$x - 4 = 0$$

$$x = 4$$

This means that when $x = 4$, there's a hole in the function. Since there's a hole, the function is not continuous.

Topic: Introduction to limits and continuity

Question: Which of the following statements about continuity is true?

Answer choices:

A A function is continuous if it exists without holes, breaks or jumps.

B A function is continuous if it exists with holes, breaks or jumps.

C A function is continuous if it exists without holes and breaks, but it can have jumps.

D A function is continuous if it exists without holes and jumps, but it can have breaks.

Solution: A

A function is continuous if it exists without holes, breaks or jumps. A hole is a point where the function does not exist. A break is a space where the function does not exist. A jump is where a function exists at two y-values for the same x-value.

Evaluating the answer choices shows that answer choice A,

"A function is continuous if it exists without holes, breaks or jumps"

is correct.