

Topic: Discontinuities of multivariable functions**Question:** Find any discontinuities of the function.

$$f(x, y) = \sqrt{y - 2x}$$

Answer choices:

- A The function is continuous
- B The function is discontinuous for $y < 2x$
- C The function is discontinuous for $y < -2x$
- D The function is discontinuous for $y < \frac{x}{2}$



Solution: B

A function is discontinuous wherever

it's undefined

it doesn't exist because of a hole in the graph

it doesn't exist because of an asymptote in the graph

its limit along two paths is different at the same point

The given function is a radical function, and radical functions don't exist as real numbers when the value under the square root is negative. Therefore, to find the points where the function is discontinuous, we solve the inequality,

$$y - 2x < 0$$

$$y < 2x$$

The function is discontinuous whenever $y < 2x$.



Topic: Discontinuities of multivariable functions**Question:** Find any discontinuities of the function.

$$f(x, y, z) = \frac{2x + 1 - z}{2y}$$

Answer choices:

- A The function is continuous
- B The function is discontinuous for $x = 0$
- C The function is discontinuous for $y = 0$
- D The function is discontinuous for $z = 1$



Solution: C

A function is discontinuous wherever

it's undefined

it doesn't exist because of a hole in the graph

it doesn't exist because of an asymptote in the graph

its limit along two paths is different at the same point

The given function is a rational function, and rational functions don't exist as real numbers when the value in the denominator is 0. Therefore, to find the points where the function is discontinuous, we solve the equality,

$$2y = 0$$

$$y = 0$$

The function is discontinuous whenever $y = 0$.



Topic: Discontinuities of multivariable functions**Question:** Find any discontinuities of the function.

$$f(x, y, z) = \ln(z - 3) + xy$$

Answer choices:

- A The function is continuous
- B The function is discontinuous for $z = 3$
- C The function is discontinuous for $z < 3$
- D The function is discontinuous for $z \leq 3$



Solution: D

A function is discontinuous wherever

it's undefined

it doesn't exist because of a hole in the graph

it doesn't exist because of an asymptote in the graph

its limit along two paths is different at the same point

The given function is a logarithmic function, and logarithmic functions don't exist as real numbers when the value inside the logarithm is negative or 0. Therefore, to find the points where the function is discontinuous, we solve the inequality,

$$z - 3 \leq 0$$

$$z \leq 3$$

The function is discontinuous whenever $z \leq 3$.

