

Determining Continuity

Find maximal open intervals where the function is two-sided continuous. List each discontinuity and classify it as removable, jump, or infinite.

1. Find intervals; identify and classify discontinuities.

$f(x) = -x - 1 + 2\left|x - \frac{5}{2}\right|$

Intervals: _____

Discontinuities / types: _____

2. Find intervals; identify and classify discontinuities.

$f(x) = \frac{2 \cdot \left(x + \frac{1}{2}\right)}{\left(x + \frac{1}{2}\right)}$

Intervals: _____

Discontinuities / types: _____

3. Find intervals; identify and classify discontinuities.

$f(x) = \begin{cases} 2 & x < -3/2 \\ x + \frac{11}{2} & x > -3/2 \end{cases}$

$f(-3/2) = 2$

Intervals: _____

Discontinuities / types: _____

4. Find intervals; identify and classify discontinuities.

$f(x) = \left\lfloor x \right\rfloor + 4$

Intervals: _____

Discontinuities / types: _____

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Find maximal open intervals where the function is two-sided continuous. List each discontinuity and classify it as removable, jump, or infinite.

5. Find intervals; identify and classify discontinuities.

$f(x) = -2 \cdot x^2 + 3 - \left|x + \frac{3}{2}\right|$

Intervals: _____

Discontinuities / types: _____

6. Find intervals; identify and classify discontinuities.

$f(x) = \frac{-\frac{1}{2} \cdot \left(x - \frac{3}{2}\right)}{\left(x - \frac{1}{2}\right)}$

Intervals: _____

Discontinuities / types: _____

7. Find intervals; identify and classify discontinuities.

$f(x) =$	$-1 \cdot x$	$x < -3/2$
	$-2 \cdot x - \frac{3}{2}$	$-3/2 < x < -1/2$
	$-x - 1$	$x > -1/2$

$f(-3/2) = \text{undefined}$

$f(-1/2) = 1/2$

Intervals: _____

Discontinuities / types: _____

8. Find intervals; identify and classify discontinuities.

$f(x) = -2 \cdot |x| + 4$

Intervals: _____

Discontinuities / types: _____

Determining Continuity
Worked Answer Key

Find maximal open intervals where the function is two-sided continuous. List each discontinuity and classify it as removable, jump, or infinite.

1. Analyze the supplied function at every critical point.

Given $f(x) = -x - 1 + 2\left|x - \frac{5}{2}\right|$

Polynomials and absolute-value terms are continuous for all real x . A corner may fail to be differentiable, but it is still continuous.

Critical point 1: $x = 5/2$

Left limit: $-7/2$ Right limit: $-7/2$ $f(5/2)$: $-7/2$

The one-sided limits and function value agree, so continuity is preserved here.

Maximal open continuity intervals: $(-\infty, \infty)$.

Determining Continuity
Worked Answer Key

Find maximal open intervals where the function is two-sided continuous. List each discontinuity and classify it as removable, jump, or infinite.

2. Analyze the supplied function at every critical point.

Given $f(x) = \frac{2 \cdot \left(x + \frac{1}{2}\right)}{\left(x + \frac{1}{2}\right)}$

After cancelling common factors: $\frac{2}{1}$

Retain the original denominator restrictions $x \neq -1/2$. Cancelled factors create holes; residual denominator factors create poles.

Critical point 1: $x = -1/2$

Left limit: 2 Right limit: 2 $f(-1/2)$: undefined

Conclusion: removable discontinuity.

Maximal open continuity intervals: $(-\infty, -1/2)$ union $(-1/2, \infty)$.

Determining Continuity

Worked Answer Key

Find maximal open intervals where the function is two-sided continuous. List each discontinuity and classify it as removable, jump, or infinite.

3. Analyze the supplied function at every critical point.

f(x) =

2

$x + \frac{11}{2}$

$f(-3/2) = 2$

$x < -3/2$

$x > -3/2$

Critical point 1: $x = -3/2$

Left limit: 2 Right limit: 4 $f(-3/2)$: 2

Conclusion: jump discontinuity.

Maximal open continuity intervals: $(-\infty, -3/2)$ union $(-3/2, \infty)$.

Determining Continuity
Worked Answer Key

Find maximal open intervals where the function is two-sided continuous. List each discontinuity and classify it as removable, jump, or infinite.

4. Analyze the supplied function at every critical point.

Given $f(x) = |x| + 4$

Polynomials and absolute-value terms are continuous for all real x . A corner may fail to be differentiable, but it is still continuous.

Critical point 1: $x = 0$

Left limit: 4 Right limit: 4 $f(0)$: 4

The one-sided limits and function value agree, so continuity is preserved here.

Maximal open continuity intervals: $(-\infty, \infty)$.

Determining Continuity

Worked Answer Key

Find maximal open intervals where the function is two-sided continuous. List each discontinuity and classify it as removable, jump, or infinite.

5. Analyze the supplied function at every critical point.

Given $f(x) = -2 \cdot x^2 + 3 - \left|x + \frac{3}{2}\right|$

Polynomials and absolute-value terms are continuous for all real x . A corner may fail to be differentiable, but it is still continuous.

Critical point 1: $x = -3/2$

Left limit: $-3/2$ Right limit: $-3/2$ $f(-3/2)$: $-3/2$

The one-sided limits and function value agree, so continuity is preserved here.

Maximal open continuity intervals: $(-\infty, \infty)$.

Determining Continuity

Worked Answer Key

Find maximal open intervals where the function is two-sided continuous. List each discontinuity and classify it as removable, jump, or infinite.

6. Analyze the supplied function at every critical point.

Given $f(x) = \frac{\frac{-1}{2} \cdot \left(x - \frac{3}{2}\right)}{\left(x - \frac{1}{2}\right)}$

After cancelling common factors:

$$\frac{-\frac{1}{2} \cdot x + \frac{3}{4}}{x - \frac{1}{2}}$$

Retain the original denominator restrictions $x \neq 1/2$. Cancelled factors create holes; residual denominator factors create poles.

Critical point 1: $x = 1/2$
Left limit: $-\infty$ Right limit: $+\infty$ $f(1/2)$: undefined
Conclusion: infinite discontinuity.

Maximal open continuity intervals: $(-\infty, 1/2)$ union $(1/2, \infty)$.

Determining Continuity

Worked Answer Key

Find maximal open intervals where the function is two-sided continuous. List each discontinuity and classify it as removable, jump, or infinite.

7. Analyze the supplied function at every critical point.

f(x) =

-1 · x

- 2 · x - $\frac{3}{2}$

- x - 1

$x < -3/2$

$-3/2 < x < -1/2$

$x > -1/2$

f(-3/2) = undefined

f(-1/2) = 1/2

Critical point 1: x = -3/2

Left limit: 3/2 Right limit: 3/2 f(-3/2): undefined

Conclusion: removable discontinuity.

Critical point 2: x = -1/2

Left limit: -1/2 Right limit: -1/2 f(-1/2): 1/2

Conclusion: removable discontinuity.

Maximal open continuity intervals: (-infinity, -3/2) union (-3/2, -1/2) union (-1/2, infinity).

Determining Continuity
Worked Answer Key

Find maximal open intervals where the function is two-sided continuous. List each discontinuity and classify it as removable, jump, or infinite.

8. Analyze the supplied function at every critical point.

Given $f(x) = -2|x| + 4$

Polynomials and absolute-value terms are continuous for all real x . A corner may fail to be differentiable, but it is still continuous.

Critical point 1: $x = 0$

Left limit: 4 Right limit: 4 $f(0)$: 4

The one-sided limits and function value agree, so continuity is preserved here.

Maximal open continuity intervals: $(-\infty, \infty)$.