

Applications - Function Domains

Example 3

Find domain of: $f(x) = \sqrt{4 - x^2}$

Applications - Function Domains

Example 3

Find domain of: $f(x) = \sqrt{4 - x^2}$

- Need: $4 - x^2 \geq 0$

Applications - Function Domains

Example 3

Find domain of: $f(x) = \sqrt{4 - x^2}$

- ▶ Need: $4 - x^2 \geq 0$
- ▶ $x^2 \leq 4$

Applications - Function Domains

Example 3

Find domain of: $f(x) = \sqrt{4 - x^2}$

- ▶ Need: $4 - x^2 \geq 0$
- ▶ $x^2 \leq 4$
- ▶ $-2 \leq x \leq 2$

Applications - Function Domains

Example 3

Find domain of: $f(x) = \sqrt{4 - x^2}$

- ▶ Need: $4 - x^2 \geq 0$
- ▶ $x^2 \leq 4$
- ▶ $-2 \leq x \leq 2$
- ▶ Domain: $[-2, 2]$

Important Theorems

- ▶ **Intermediate Value Theorem:** If f continuous on $[a, b]$, takes all values between $f(a)$ and $f(b)$

Important Theorems

- ▶ **Intermediate Value Theorem:** If f continuous on $[a, b]$, takes all values between $f(a)$ and $f(b)$
- ▶ **Extreme Value Theorem:** Continuous on $[a, b] \Rightarrow$ attains max and min

Important Theorems

- ▶ **Intermediate Value Theorem:** If f continuous on $[a, b]$, takes all values between $f(a)$ and $f(b)$
- ▶ **Extreme Value Theorem:** Continuous on $[a, b] \Rightarrow$ attains max and min
- ▶ **Mean Value Theorem:** If f differentiable on (a, b) , $\exists c \in (a, b)$ with:

$$f'(c) = \frac{f(b) - f(a)}{b - a}$$

Summary

- ▶ Intervals: sets of real numbers

Summary

- ▶ Intervals: sets of real numbers
- ▶ Notation: $[$ for included, $($ for excluded

Summary

- ▶ Intervals: sets of real numbers
- ▶ Notation: $[$ for included, $($ for excluded
- ▶ Types: closed, open, half-open, infinite

Summary

- ▶ Intervals: sets of real numbers
- ▶ Notation: $[$ for included, $($ for excluded
- ▶ Types: closed, open, half-open, infinite
- ▶ Properties: intersection, length, center

Summary

- ▶ Intervals: sets of real numbers
- ▶ Notation: $[$ for included, $($ for excluded
- ▶ Types: closed, open, half-open, infinite
- ▶ Properties: intersection, length, center
- ▶ Applications: inequalities, domains, theorems

Summary

- ▶ Intervals: sets of real numbers
- ▶ Notation: $[$ for included, $($ for excluded
- ▶ Types: closed, open, half-open, infinite
- ▶ Properties: intersection, length, center
- ▶ Applications: inequalities, domains, theorems
- ▶ Graphical: \bullet , \circ , \rightarrow

Summary

- ▶ Intervals: sets of real numbers
- ▶ Notation: $[$ for included, $($ for excluded
- ▶ Types: closed, open, half-open, infinite
- ▶ Properties: intersection, length, center
- ▶ Applications: inequalities, domains, theorems
- ▶ Graphical: \bullet , \circ , \rightarrow
- ▶ Fundamental in real analysis

Summary

- ▶ Intervals: sets of real numbers
- ▶ Notation: $[$ for included, $($ for excluded
- ▶ Types: closed, open, half-open, infinite
- ▶ Properties: intersection, length, center
- ▶ Applications: inequalities, domains, theorems
- ▶ Graphical: \bullet , \circ , \rightarrow
- ▶ Fundamental in real analysis
- ▶ Essential for calculus

Summary

- ▶ Intervals: sets of real numbers
- ▶ Notation: $[$ for included, $($ for excluded
- ▶ Types: closed, open, half-open, infinite
- ▶ Properties: intersection, length, center
- ▶ Applications: inequalities, domains, theorems
- ▶ Graphical: \bullet , \circ , \rightarrow
- ▶ Fundamental in real analysis
- ▶ Essential for calculus
- ▶ Basis for advanced mathematics