Maxima and Minima Quiz Answer Key PDF

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What can be determined using the first derivative of a function?

A. Critical points ✓

B. Points of inflection

C. Increasing or decreasing intervals ✓

D. Concavity of the function

Which of the following are necessary to apply the second derivative test?

A. The first derivative must be zero ✓

B. The second derivative must be positive or negative ✓

C. The function must be continuous ✓

D. The function must be differentiable

What is a critical point of a function?

A. A point where the function is undefined

B. A point where the derivative is zero or undefined ✓

C. A point where the function has a maximum value

D. A point where the function has a minimum value

What does the second derivative test help determine?

A. The slope of the tangent line

B. The rate of change of the function

C. The concavity of the function at critical points ✓

D. The absolute maximum value of the function

What is an inflection point?

A. A point where the function reaches its maximum value
B. A point where the function reaches its minimum value
C. A point where the concavity of the function changes ✓
D. A point where the derivative is zero

Which of the following are applications of finding maxima and minima?

A. Minimizing cost in economics ✓
B. Maximizing profit in business ✓
C. Determining the speed of a car
D. Calculating the area of a triangle

Which of the following is NOT a method to find maxima and minima?

A. Graphical Analysis
B. Numerical Integration ✓
C. First Derivative Test
D. Second Derivative Test

In which scenario is a global maximum found?

A. When the function is increasing
B. When the function is decreasing
C. When the function reaches its highest value overall ✓
D. When the function has no critical points

Which of the following are characteristics of global extrema?

A. They are the highest or lowest points in the entire domain ✓
B. They can be found using derivative tests ✓
C. They are always critical points
D. They occur only at endpoints of the domain

Which of the following is a local extremum?

A. The highest point on the entire graph
B. A point higher than all nearby points ✓

C. A point lower than all nearby points ✓
D. Both B and C ✓

Which test involves analyzing the sign changes of the first derivative around critical points?

A. Second Derivative Test
B. First Derivative Test ✓
C. Concavity Test
D. Inflection Point Test

What is the primary purpose of finding maxima and minima in real-world applications?

A. To determine the average value of a function
B. To optimize processes and outcomes ✓
C. To calculate the area under a curve
D. To find the slope of a line

Which of the following statements are true about concavity?

A. A function is concave up if its second derivative is positive ✓
B. A function is concave down if its second derivative is negative ✓
C. Concavity determines the slope of the tangent line
D. Concavity changes at inflection points ✓

Which of the following are true about local extrema?

A. They occur at critical points ✓
B. They are always global extrema
C. They can be identified using the first derivative test ✓
D. They occur where the second derivative is zero