A

Select Question: Question 1

Select Student: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

A1

Need manual marking

Need review

Original

A3

One | Problem | All

A2

Marked/Total 15/15 | Highest 8 | Lowest 0 | Average

B

Question 1 What's the differences between interpolation and approximation? (Problem Distinction, Solution Differences, Advantages Comparison, Disadvantages Comparison)

8 marks

B1

Confirm Result | Set as Standard

B2

correct | wrong | unclear | split | erase | reset | 4 marks

The difference between interpolation and approximation:

Problem: Interpolation means fitting a function that passes through the given data points, matching their values exactly. Approximation means choosing a fitting function with errors sufficiently small between the function and the data points, reflecting the overall distribution of the data points, and able to fit the object represented by the data.

Solution: Interpolation obtains a function that passes through all the data points, but it may not meet other requirements. Approximation fits a curve with sufficiently small errors based on the data points. Function fitting means, within an acceptable error range, fitting numbers that meet the requirements. For function fitting, one would choose a possible function space and basis functions, then adjust parameters to obtain a fitting function with sufficiently small error.

Advantages: Interpolation has zero error, and can cover and approximate the data points. Approximation has non-zero error, but is sufficiently smooth and continuous.

Disadvantages: The curve obtained by interpolation is not smooth and may be discontinuous; approximation is easily affected by noise points and may produce unexpected values.

B3

Reference Answer

Erase

Scoring Point 1 (Problem Distinction: Interpolation)
Given a set of discrete points, find a curve or function that passes through all points.

Scoring Point 2 (Problem Distinction: Approximation)
Given a set of discrete points, find a curve or function that is as close as possible to but not necessarily passing through all points, often used in noisy data situations.

Scoring Point 3 (Solution Difference: Interpolation)
Polynomial interpolation (e.g. Lagrange interpolation, Newton interpolation), spline interpolation (e.g. cubic spline); other reasonable solution is also acceptable

Scoring Point 4 (Solution: Approximation)
Least squares method (polynomial approximation, spline approximation), Bezier curve fitting, smoothing methods; other reasonable solution is also acceptable

Scoring Point 5 (Advantage: Interpolation)
Passes through all data points accurately, suitable for precise data modeling without noise

B4

Score Reason

Reason(scoring point 2): Student correctly explained that approximation seeks a function close to the data points without the strict requirement to pass through each one.

submit

B5