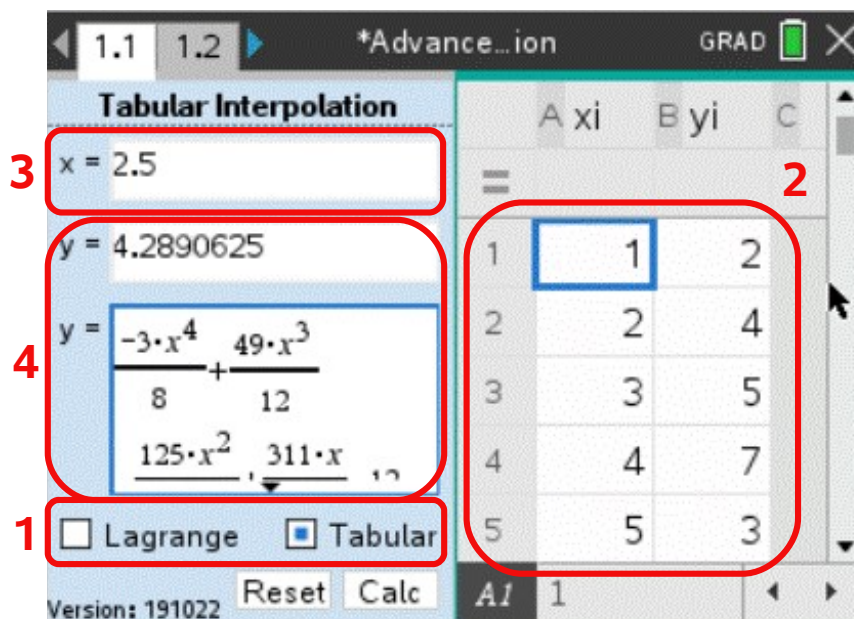# Advanced Interpolation, User Guide

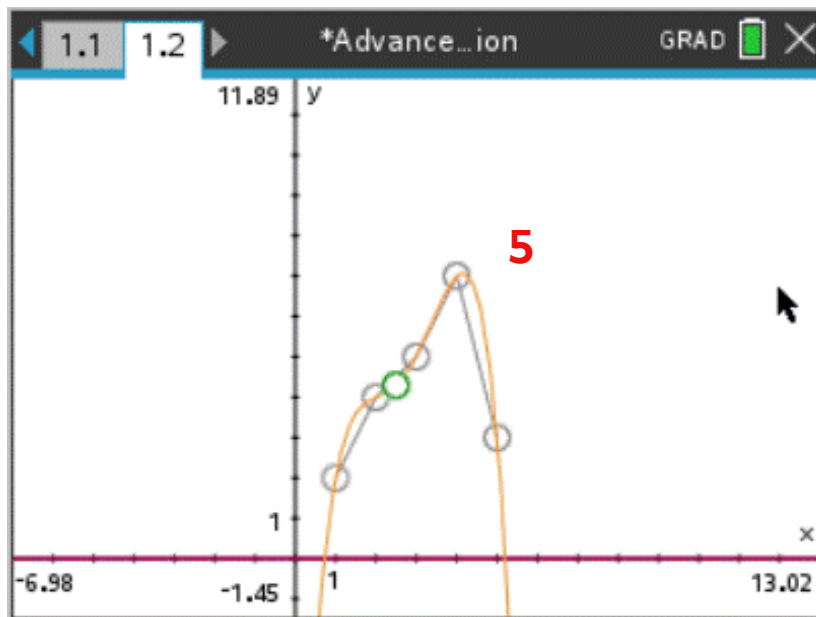

Main Window 1.1

How to perform calculations

1. Start by selecting preferred interpolation method. (It is also possible to use Tab key or the menu button on the hand held unit.)

   - Lagrange interpolation creates a polynomial for calculating *y* from a given *x* based on minimum three given points.

   - Spline interpolation creates a piecewise polynomial for calculating *y* from a given *x* based on minimum three given points. (The spline is a natural cubic spline).

   - Tabular interpolation uses either three or five given points to calculate *y* from a given *x*. The application will automatically choose between three or five tabular method depending on table length.

2. Enter known points into table *xi,yi*.

   - All *xi* values must be unique!

   - Lagrange and spline interpolation requires minimum three given points to complete calculation. Maximum recommended given points are ten. Tabular interpolation requires either three or five given points for calculations.

   - When using tabular interpolation all *xi* values must be evenly distributed. Lagrange and spline interpolation does not require evenly distributed *xi* values.

   - When using tabular or spline interpolation all *xi* values must be sorted in ascending order.

3. Enter value x for which value *y* shall be calculated. Press Calc button or Enter key to complete the calculation.

   - When using tabular interpolation the given *x* must be between centre *xi* value and nearby *xi* value. From above example *x* must be between 2 and 4 for conducting tabular calculations.

   - When using Lagrange or spline method x must be within the range of table *xi*.

4. The top y−box displays the calculated value of *y* from given *x*. Bottom y−box displays the equation used for calculating *y*.

Graph Window 1.2

5. Go to page 1.2 to view the graph plotted for latest calculation. Page 1.2 is a standard Nspire graph page, so for further details on how work with graphs, see TI's user manual.

   - Black point, shows the calculated *y* and given *x*.

   - Gray points, shows the points entered in table xi,yi.

   - Orange graph, shows the function calculated from 5 tabular points.

   - Red graph, shows the function calculated from 3 tabular points.

   - Blue graph, shows the function calculated with Lagrange Interpolation method.

   - Green graph, shows the function calculated with Lagrange Interpolation method.

Notes

- Reset button removes all data from application. It is also possible to make reset by pressing Esc key two times quickly.

- Program scale to fit all resolutions. Minimum resolution is 212 x 318 px used by hand held unit. Horizontal split or any other custom split view other than the default is not supported.

- If further calculations is needed, the functions used to display the graphs are stored in variables *lagrangefunction*, *tabular3function, tabular5function* and *splinefunction*.

- The Lua script is password protected. However, the password to the script is the version <u>*number*</u> displayed in bottom left corner on page 1.1.

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