Second Derivative

MATH NSPIRED

TI-Nspire™ DOCUMENT NOTES

About the Mathematics

The *Second_Derivative* documents provide tools for visualizing the relationship between the graph of a function and the graph of its second derivative.

Objective

- This activity allows students to see graphically how the second derivative value is related to the concavity of a function's graph by making use of a dynamic "quadratic of best fit."
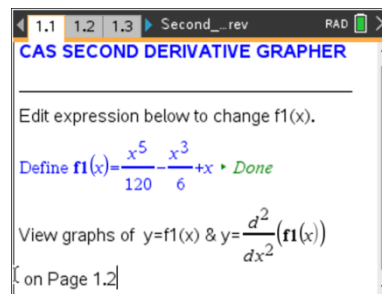
Using the Documents

There are four documents that are intended for different versions of TI-Nspire, two (CAS and numeric) for the handheld and two (CAS and numeric) for the computer.

In each, page 1.1 provides the opportunity to define **f1**(x) in an interactive math box. On page 1.2, the graph of **f1** and its second derivative are displayed. On page 1.4 (1.3 in the software version), the user can trace the function using slider arrows and see the parabola of best fit (second degree Taylor polynomial graph) and a display of the value of the second derivative. Finally, on page 1.5 (1.4 in the software version), the trace is coordinated between the graph of the original function and the graph of its second derivative so students can see the direct connection.

Possible Application

The parabola of best fit is a graphic indicator of concavity (parabola opening up or down as the function graph is concave up or down). The documents can be used to develop general relationships between concavity of the function graph and the sign of the second derivative, leading to a development of the second derivative test for extrema and a discussion of inflection points.

TI-Nspire™ Technology Skills:
- Download a TI-Nspire document
- Open a document
- Move between pages
- Click on a minimized slider

Tech Tips:
- Make sure the font size on your TI-Nspire handheld is set to Medium.
- You can hide the function entry line by pressing ⒸⓉⓇⓁ Ⓖ.

Lesson Materials:
Second_Derivative_CAS.tns
Second_Derivative_Numeric.tns
Second_Derivative_CAS_Software.tns
Second_Derivative_Numeric_Software.tns

Visit www.mathnspired.com for lesson updates.

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