Hints exercise 7

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Pen and Paper

Question 1

- Apply Richardson to approximate derivates.
- Use the provided formulas and compare your result with the true solution.

Question 2

- Check out the provided code and fill in the gaps.
- First compute the necessary integrals and than combine them to achieve higher precision.
- Watch out because trapezoidal rule has no third order error.

Question 3

- Perform a Romberg Integration on the provided function.
- The terms become messy overtime but can be calculated by hand.
- Start with one interval and then subdivide the interval to achieve I_2^1 (see lecturenotes example).

Notebook

Question 1

- Implement the derived algorithm from the pen and paper exercise
- To minimize function evaluations calculate first all values for the smallest grid-spacing and think about which values are used in the coarser approximations.

Question 2

- Sanity check your results with the provided hints and plot your solution.