Hints exercise 6

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Pen and Paper

Question 1

- Calculate the Lagrange polynomials and integrate them
- Use the properties of C_k^M to accelerate the calculation

Question 2

- Use the sum formulations
- Trapezoidal rule: $I \approx \frac{\Delta_x}{2}\left(f(x_0) + 2\sum_{i=1}^{N-1} f(x_i) + f(x_N)\right)$
- Simpson's rule: $I \approx \frac{\Delta_x}{2}\left(f(x_0) + 4\sum_{\substack{i=1 \\ i=odd}}^{N-1} f(x_i) + 2\sum_{\substack{i=2 \\ i=even}}^{N-2} f(x_i) + f(x_N)\right)$

Question 3

- Take the logarithmic scale into consideration
- How does the error formulation look like and what influences the error if the interval is given?
- Formulate an expression for the whole integral and simplify by considering worst case scenarios.
- How influences the number of datapoints the intervalsize?

Notebooks

Question 1

- The command csv.open might be of use. Check out the link.

Question 2

- Check out the composite quadratures. You can formulate the integral with an dot product to avoid a for loop
- Implement the suggested functions.

Question 3

- Calculate the solution analytically and compare it with the obtained values in 2. Which quadrature should perform better?