

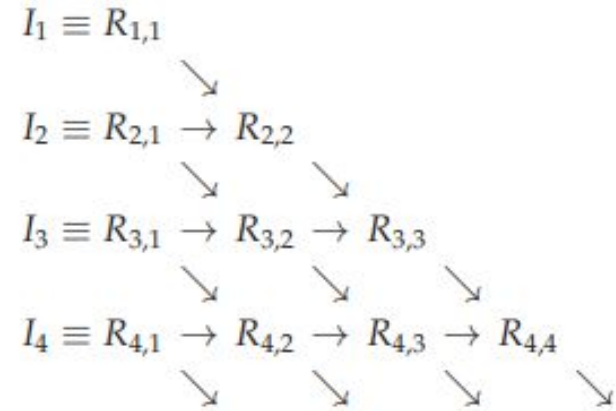
Romberg integration

A method of integration that uses Richardson

Extrapolation repeatedly on the trapezoidal rule.

- Evaluates the integral at equally spaced points
- Works best with integrands that are not highly variable
- Process:

- 1. Use trapezoidal integration over the first two intervals
- 2. Use for $R(2,2) \rightarrow$
- 3. Use trapezoidal rule for $R(3,1)$ and the above for $R(3,2)$ $R(3,3)$
- 4. Repeat step 3 for each additional level.
- 5. Use to calculate error



$$R_{i,m+1} = R_{i,m} + \frac{1}{4^m - 1} (R_{i,m} - R_{i-1,m}),$$

$$c_m h_i^{2m} = \frac{1}{4^m - 1} (R_{i,m} - R_{i-1,m}) + O(h_i^{2m+2}),$$