

Engineering Analysis ENG 3420 Fall 2009

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Office: HEC 439 B

Office hours: Tu-Th 11:00-12:00

Lecture 24

- Attention: The last homework HW5 and the last project are due on Tuesday November 24!!
- Last time:
 - Lagrange interpolating polynomials
 - Splines
- Today
 - Cubic splines
 - Searching and sorting
 - Numerical integration (chapter 17)
- Next Time
 - Numerical integration

Cubic splines

- Cubic splines → the simplest representation with the appearance of smoothness and without the problems of higher order polynomials.
 - Linear splines have discontinuous first derivatives
 - Quadratic splines have discontinuous second derivatives and require setting the second derivative at some point to a pre-determined value
 - Quartic or higher-order splines tend to exhibit ill-conditioning or oscillations.
- The cubic spline function for the i^{th} interval can be written as:
$$s_i(x) = a_i + b_i(x - x_i) + c_i(x - x_i)^2 + d_i(x - x_i)^3$$
- For n data points, there are $(n-1)$ intervals and thus $4(n-1)$ unknowns to evaluate to solve all the spline function coefficients.