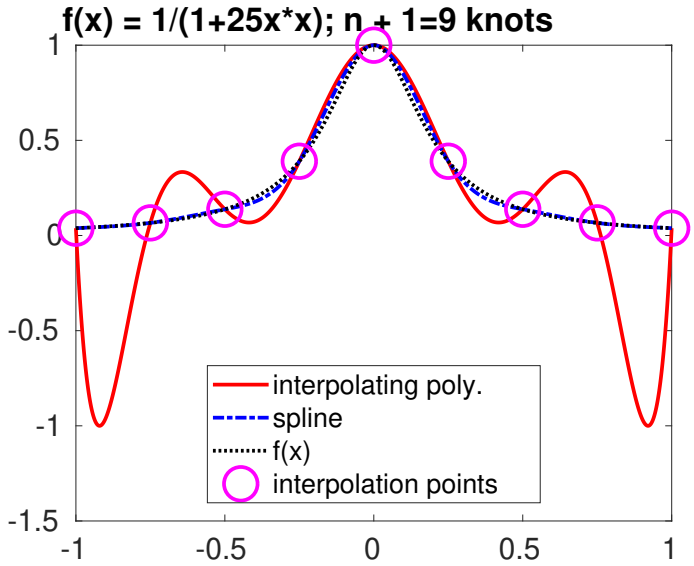
Polynomial interpolation vs. spline interpolation



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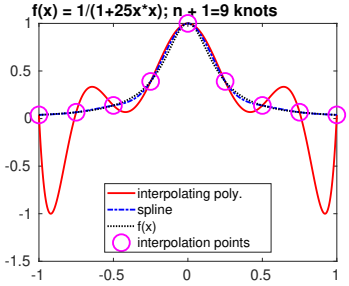
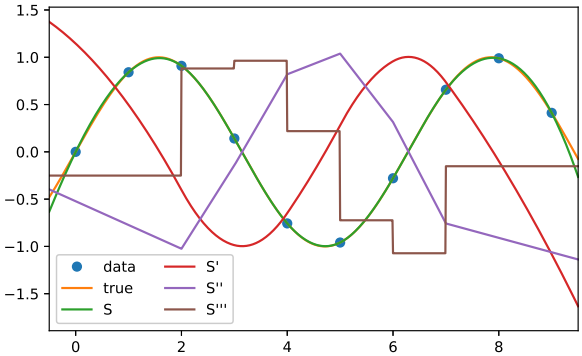


- polynomial interpol. may be a poor approximation for given knots (e.g., uniform distrib.)
- polynomial interpolation is not local:
  - often, this does not reflect properties of the problem under consideration
  - makes the evaluation at each point x expensive (cost: $O(\text{number knots})$)
  - error in one data point impacts the approximation everywhere

An example of the cubic spline from $S^{3,2}(\Delta)$



- "not-a-knot" cubic spline for data $(i, \sin(i))$, $i = 0, \ldots, 9$
- plot of the spline S and its derivatives: $S \in C^2$, $S' \in C^1$, $S'' \in C^0$, S''' is p.w. constant