

# Appendix

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A spline function is a piecewise polynomial function joined together with certain continuity conditions satisfied.

## Polynomial splines

### *Linear Spline*

For a set of data points usually termed knots:  $(x_i, y_i), i = 1, 2, \dots, \kappa$  the linear spline is defined as  $S_i(x) = \alpha + \beta \times x$  for  $x \in [x_i, x_{i+1}], i = 1, 2, \dots, \kappa$ . Since the spline has to be continuous ( $C^0$ ),  $s_i(x_i) = y_i = s_{i+1}(x_i)$ . This yields  $2(\kappa-2)$  equations to solve at the interior points. Linear splines are often called minimum-maximum functions.

*an example*

## Cubic splines are smoothest interpolators

If we consider a set of points  $x_i, y_i : i = 1, 2, \dots, \kappa$ , where  $x_i < x_{i+1}$ . The cubic spline  $g(x)$  is a function made up of sections of cubic polynomial derived within the intervals  $[x_i, x_{i+1}]$ , with the following properties:

- $g(x_i) = y_i$
- $g'(x_1) = g'(x_n)$

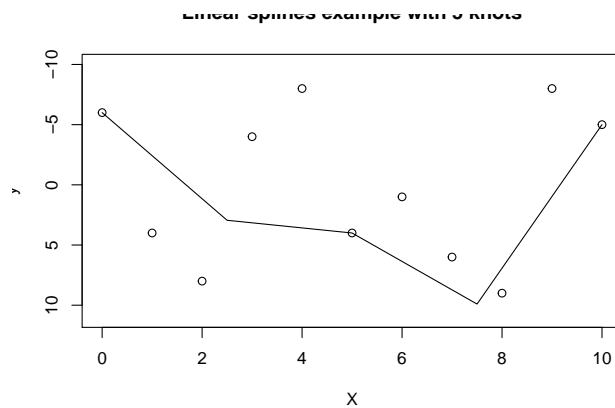


Figure 1: two plots