○ Approximation mit Newton-Polynomen

■ appnewtonpoly.nb Prof. Dr. Dörte Haftendorn *Mathematica* Apr 97 Jan 01

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x0 = 1; y0 = 5; x1 = 2; y1 = 2; x2 = 5; y2 = 3; x3 = 7; y3 = 5;
stuetzpunkte = {{x0, y0}, {x1, y1}, {x2, y2}, {x3, y3}}
xmin = x0 - 1; xmax = x3 + 1;
```

{{1, 5}, {2, 2}, {5, 3}, {7, 5}}

■ Newton-Interpolation Ansatz: new[x_]:= c0+c1(x-x0)+c2(x-x0)(x-x1)+c3(x-x0)(x-x1)(x-x2)

```
nw0[x_] := 1; nw1[x_] := x - x0;  nw2[x_] := (x - x0) (x - x1); nw3[x_] := (x - x0) (x - x1) (x - x2)

c0 = y0;
{c1} = c /. Solve[c0 + c (x1 - x0) == y1, c];
{c2} = c /. Solve[c0 + c1 (x2 - x0) + c (x2 - x0) (x2 - x1) == y2, c];
{c3} =
  c /. Solve[c0 + c1 (x3 - x0) + c2 (x3 - x0) (x3 - x1) + c (x3 - x0) (x3 - x1) (x3 - x2) == y3, c];
{c0, c1, c2, c3}
new[x_] := c0 nw0[x] + c1 nw1[x] + c2 nw2[x] + c3 nw3[x]; new[x]
```

$\left\{5, -3, \frac{5}{6}, -\frac{7}{60}\right\}$

$5 - 3 (-1 + x) + \frac{5}{6} (-2 + x) (-1 + x) - \frac{7}{60} (-5 + x) (-2 + x) (-1 + x)$

```
newtonPlot = Plot[{(*h[x],*) new[x], nw0[x], nw1[x], nw2[x], nw3[x], 0}, {x, xmin, xmax},
    PlotStyle → Farbig, PlotRange → {-1, 6}, AspectRatio → Automatic,
   GridLines → {Table[i, {i, xmin, xmax}], Table[i, {i, -1, 6}]},
    Epilog -> {Text[FontForm["x", {"Times-Bold", 14}], {7.5, -0.2}, {-1, 0}, {1, 0}], Text["
                        Map[Point, stuetzpunkte]}];
```