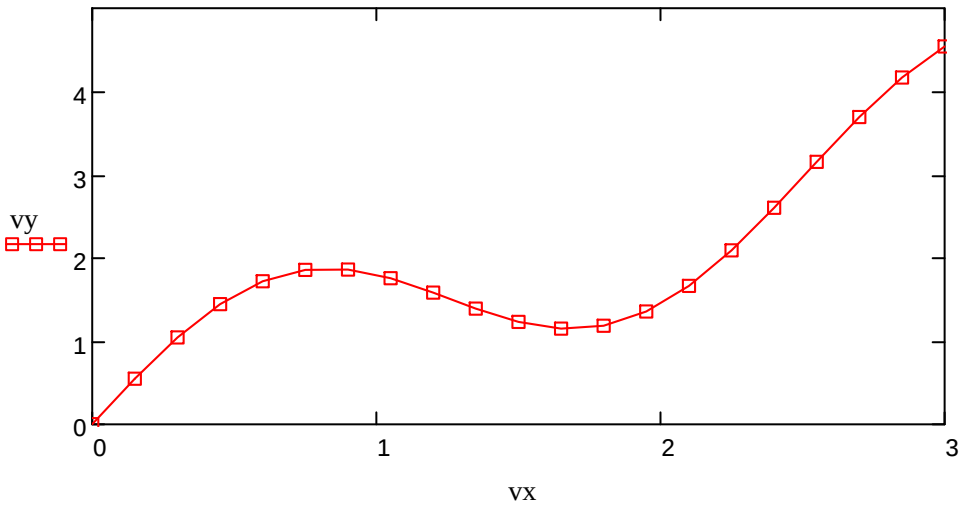
$N := 20$ $\Delta x := 0.15$

$i := 0..N$ $f(x) := \sin(2.5 \cdot x) + 1.2 \cdot x$

$vx_i := i \cdot \Delta x$ $vy_i := f(vx_i)$

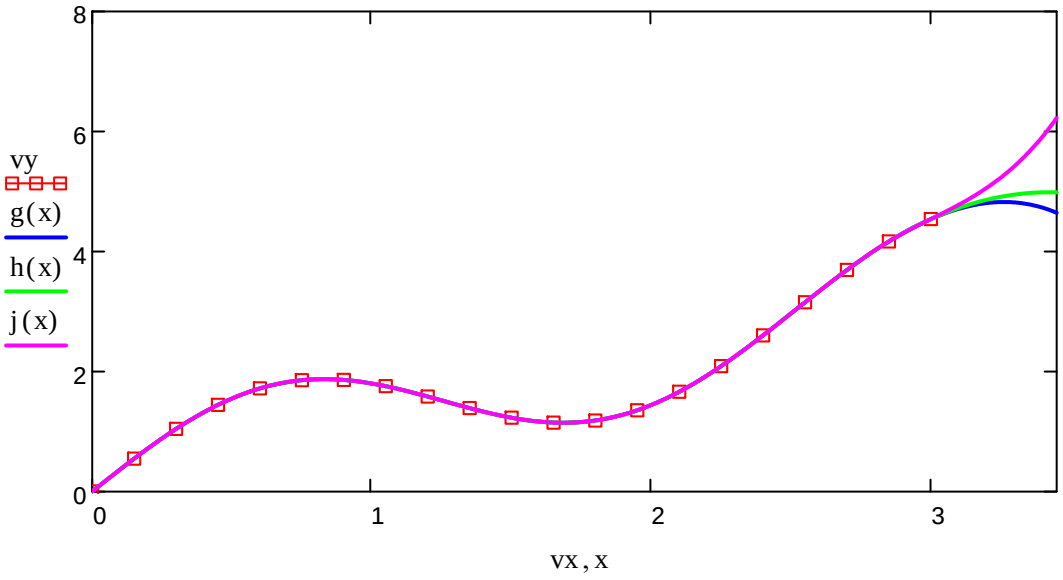


Cubic Spline Fit

$vs := cspline(vx, vy)$ $g(x) := interp(vs, vx, vy, x)$

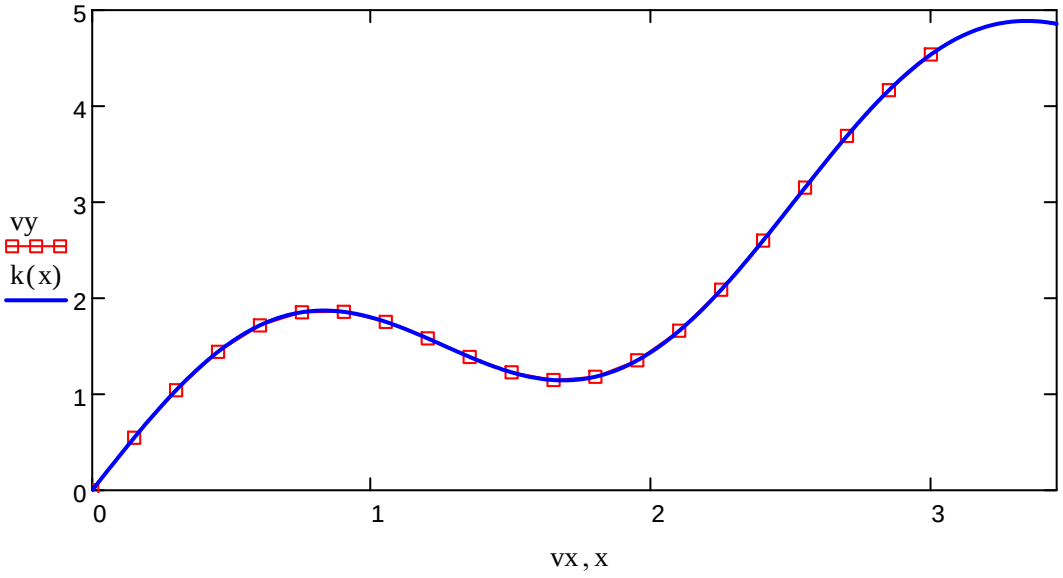
$vs := pspline(vx, vy)$ $h(x) := interp(vs, vx, vy, x)$

$vs := lspline(vx, vy)$ $j(x) := interp(vs, vx, vy, x)$

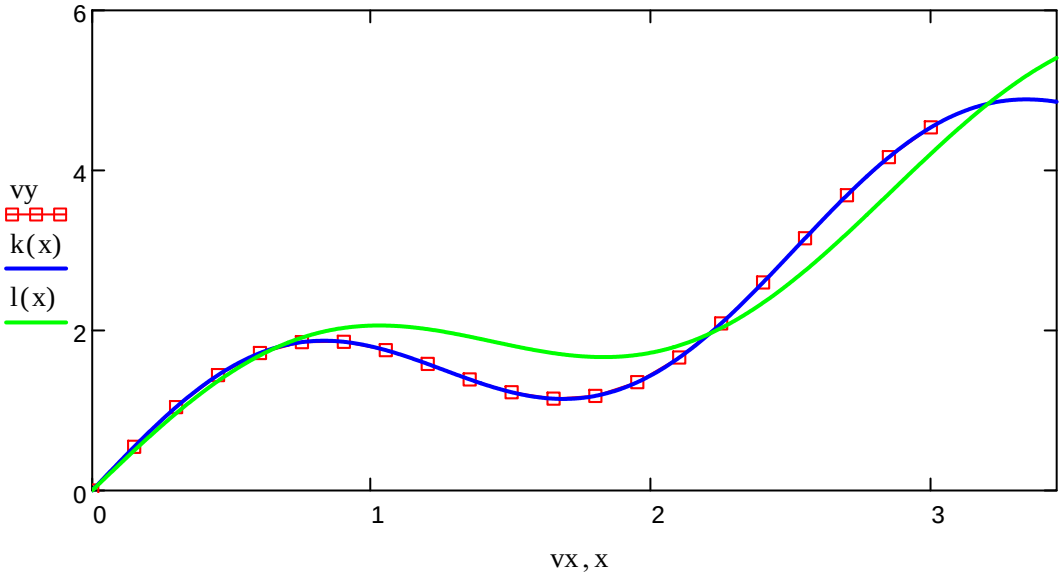


Regression Fit by Linear Combination of Functions

$$F(x) := \begin{pmatrix} \sin(2.5 \cdot x) \\ x \end{pmatrix} \quad V := \text{linfit}(vx, vy, F) \quad V = \begin{pmatrix} 1 \\ 1.2 \end{pmatrix} \quad k(x) := V \cdot F(x)$$



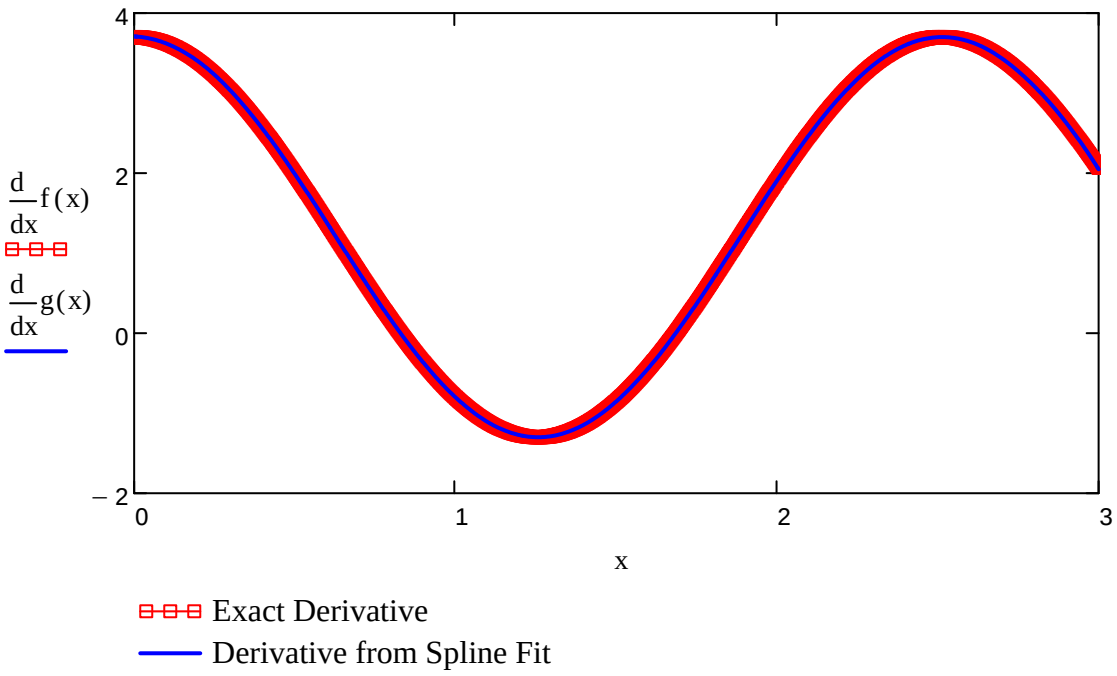
$$F(x) := \begin{pmatrix} \sin(2.2 \cdot x) \\ x \end{pmatrix} \quad V := \text{linfit}(vx, vy, F) \quad V = \begin{pmatrix} 0.934 \\ 1.306 \end{pmatrix} \quad l(x) := V \cdot F(x)$$



Differentiation and Integration of Data Sets

After cubic spline fitting we have an analytical equation for the function in terms of 3rd order polynomials, for which we can calculate the derivative or which we can

integrate.



$$\int_0^{\frac{\pi}{2}} f(x)\,dx = 2.1632833726$$ Numerical Integration of Exact Function

$$\int_0^{\frac{\pi}{2}} g(x)\,dx = 2.1632800248$$ Numerical Integration of Spline Fitted Function