negative gradient \[-\nabla f := -\frac{\partial f}{\partial x_i}\]

Interpolant \[f(t) = \sum_{j=1}^{n} x_j \phi_j(t) = \Phi \cdot \phi\]

Coefficient (weight) of \(\phi_i\)

\[\phi_i = \begin{bmatrix} \phi_1 \\ \vdots \\ \phi_m \end{bmatrix}\]

\[x = \Phi \cdot y\]

Monomial

Power form of polynomial

\[\phi_j(t) = (t - \xi_j) \phi_j(t)\]

Vandermonde

\[x = \Phi \cdot y\]

Newton form

\[\phi_j(t) = \frac{\sum_{k=1}^{n} x_j \phi_j(t_k)}{t - t_k}\]

\[\text{nested multiplication is slow evaluation}\]

\[y = I \cdot x\]

Lagrange form

\[\phi_2 = \frac{(t - t_1)(t - t_3)}{(t_2 - t_1)(t_2 - t_3)}\]

\[\phi_2(t_1) = 0 \quad \phi_2(t_2) = 1\]

\[\phi_2(t_3) = 0\]

\[y = I \cdot x\]

Slow evaluation

\[\text{divided difference table}\]