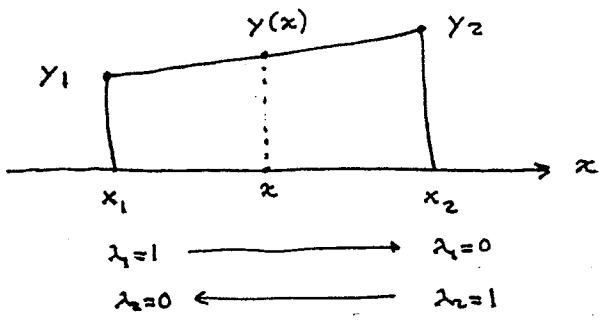
Neil E Cotter
Apr 1994

tool: The formula for linear interpolation is used for piecewise linear approximations:

Neil E Cotter
2 May 1994

$$y(x) = \lambda_1 y_1 + \lambda_2 y_2$$

where $\lambda_1 \equiv \dfrac{x_2 - x}{x_2 - x_1}$ and $\lambda_2 \equiv \dfrac{x - x_1}{x_2 - x_1}$



check: At the halfway point between x_1 and x_2 we have $x = \dfrac{x_1 + x_2}{2}$ and we should get $y = \dfrac{y_1 + y_2}{2}$.

$$y\left(\frac{x_1 + x_2}{2}\right) = \lambda_1 y_1 + \lambda_2 y_2$$

$$\lambda_1 = \frac{x_2 - \frac{x_1 + x_2}{2}}{x_2 - x_1} = \frac{\frac{x_2}{2} - \frac{x_1}{2}}{x_2 - x_1} = \frac{1}{2}$$

$$\lambda_2 = \frac{\frac{x_1 + x_2}{2} - x_1}{x_2 - x_1} = \frac{\frac{x_2}{2} - \frac{x_1}{2}}{x_2 - x_1} = \frac{1}{2}$$

$$y\left(\frac{x_1 + x_2}{2}\right) = \frac{1}{2} y_1 + \frac{1}{2} y_2 \quad \checkmark$$

note: This formulation in terms of λ's has the advantage of being symmetric in the variables.