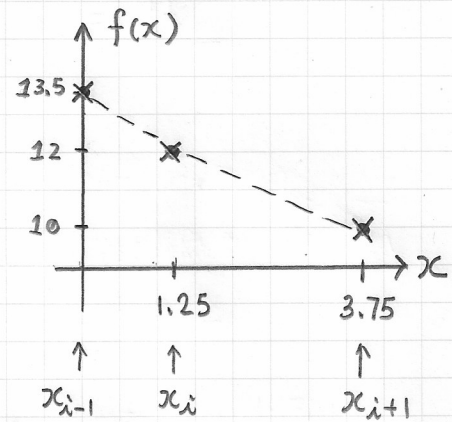


Handling Derivatives of Unequally Spaced Data

The formula for the derivative is,

$$f'(x) = f(x_{i-1}) \frac{2x - x_i - x_{i+1}}{(x_{i-1} - x_i)(x_{i-1} - x_{i+1})} \\ + f(x_i) \frac{2x - x_{i-1} - x_{i+1}}{(x_i - x_{i+1})(x_i - x_{i-1})} \\ + f(x_{i+1}) \frac{2x - x_{i-1} - x_i}{(x_{i+1} - x_{i-1})(x_{i+1} - x_i)}$$

Say we have 3 points,



We want to evaluate $f'(x)$ at $x=2$, then

$$f'(2) = 13.5 \frac{2(2) - 1.25 - 3.75}{(0 - 1.25)(0 - 3.75)} \quad -2.88 \\ + 12 \frac{2(2) - 0 - 3.75}{(1.25 - 0)(1.25 - 3.75)} \quad -0.96 \\ + 10 \frac{2(2) - 0 - 1.25}{(3.75 - 0)(3.75 - 1.25)} \quad 2.93$$

$$f'(2) = -0.9067 \quad \#$$

* Do this for each set of three adjacent points

* Obtain results within the range of known data,

that is $0 \leq x \leq 3.75$ #