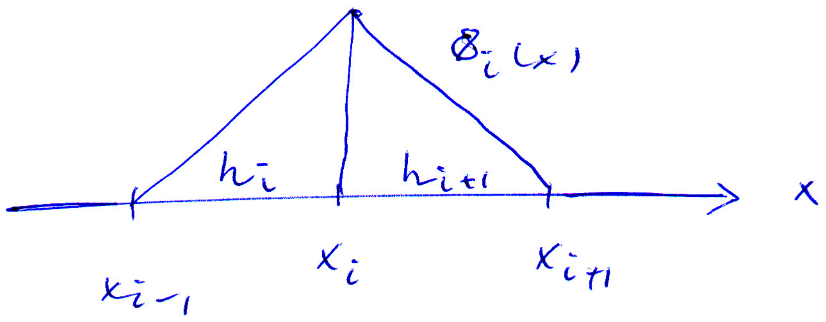
A is symmetric: $a_{ij} = \int_0^1 \phi_j' \phi_i' \, dx = \int_0^1 \phi_i' \phi_j' \, dx = a_{ji}$

$$\phi_i(x) = \begin{cases} (x - x_{i-1})/h_i & x_{i-1} \le x \le x_i \\ (x_{i+1} - x)/h_{i+1} & x_i \le x \le x_{i+1} \end{cases}$$



$$\phi_i'(x) = \begin{cases} \dfrac{1}{h_i} & x_{i-1} \le x \le x_i \\ -\dfrac{1}{h_{i+1}} & x_i \le x \le x_{i+1} \end{cases}$$

$$a_{ii} = \int_{x_{i-1}}^{x_i} \left(\frac{1}{h_i}\right)^2 dx + \int_{x_i}^{x_{i+1}} \left(\frac{-1}{h_{i+1}}\right)^2 dx = \frac{1}{h_i} + \frac{1}{h_{i+1}}$$

$$a_{i\,i+1} = \int_{x_i}^{x_{i+1}} \frac{-1}{h_{i+1}} \frac{1}{h_{i+1}} \, dx = -\frac{1}{h_{i+1}} = a_{i+1\,i}$$

$$a_{i-1\,i} = \int_{x_{i-1}}^{x_i} \frac{1}{h_i} \frac{-1}{h_i} \, dx = -\frac{1}{h_i} = a_{i\,i-1}$$

$$b_i = \int_{x_{i-1}}^{x_i} f(x) \frac{x - x_{i-1}}{h_i} \, dx + \int_{x_i}^{x_{i+1}} f(x) \frac{x_{i+1} - x}{h_{i+1}} \, dx$$