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(1) $x^2u'' + xu' + u = x \qquad u'(1) = 2 \quad u'(2) = 0 \qquad x_0 = 1$ [redacted]

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

$$u''(x_i) = \frac{u(x_{i+1}) - 2u(x_i) + u(x_{i-1})}{h^2}$$

$$z(1):\ x_i^2 \cdot \frac{u(x_{i+1}) - 2u(x_i) + u(x_{i-1})}{h^2} + x_i \cdot \frac{u(x_{i+1}) - u(x_{i-1})}{2h} + u(x_i) = x_i$$

$$u(x_{i+1}) \cdot \left[\frac{x_i^2}{h^2} + \frac{x_i}{2h}\right] + u(x_i) \cdot \left[\frac{-2x_i^2}{h^2} + 1\right] + u(x_{i-1}) \cdot \left[\frac{x_i^2}{h^2} - \frac{x_i}{2h}\right] = x_i$$

dla $x_0 = 1 \quad u'(1) = 2$

wychodzi za przedział

$$2 = \frac{u(x_{i+1}) - u(x_{i-1})}{2h}$$

$$u(x_{i-1}) = u(x_{i+1}) - 4h$$

$$z(1):\ x_i^2 \cdot \frac{2u(x_{i+1}) - 2u(x_i) - 4h}{h^2} + x_i \cdot \frac{4h}{2h} + u(x_i) = x_i$$

$$u(x_{i+1}) \cdot \left[\frac{2x_i^2}{h^2}\right] + u(x_i) \cdot \left[\frac{-2x_i^2}{h^2} + 1\right] = -x_i + \frac{4x_i^2}{h}$$

dla $x_n = 2 \quad u'(2) = 0$

wychodzi za przedział

$$0 = \frac{u(x_{i+1}) - u(x_{i-1})}{2h}$$

$$A \cdot B = C$$

$$u(x_{i+1}) = u(x_{i-1})$$

$$B = A^{-1} \cdot C$$

$$z(1):\ u(x_i) \left[\frac{-2x_i^2}{h^2} + 1\right] + u(x_{i-1}) \cdot \left[\frac{2x_i^2}{h^2}\right] = x_i$$

$$\begin{bmatrix} \frac{-2x_i^2}{h^2}+1 & \frac{2x_i^2}{h^2} & 0 & 0 & \vdots & 0 & 0 \\ \frac{x_i^2}{h^2} - \frac{x_i}{2h} & \frac{-2x_i^2}{h^2}+1 & \frac{x_i^2}{h^2} + \frac{x_i}{2h} & 0 & \cdots & 0 & 0 \\ 0 & \frac{x_i^2}{h^2} - \frac{x_i}{2h} & \frac{-2x_i^2}{h^2}+1 & \frac{x_i^2}{h^2} + \frac{x_i}{2h} & & 0 & 0 \\ & & \vdots & & \ddots & & \\ 0 & 0 & 0 & 0 & 0 & \frac{2x_i^2}{h^2} & \frac{-2x_i^2}{h^2}+1 \end{bmatrix} \cdot B = \begin{bmatrix} -x_0 + \frac{4x_0^2}{h} \\ f(x_1) \\ f(x_2) \\ \vdots \\ \vdots \\ [redacted] \end{bmatrix}$$