$$\#y'' = \frac{-4}{x}y' - \frac{2}{x^2}y + \frac{2\ln(x)}{x^2},\ y(1) = \frac{1}{2},\ y(2) = \ln(2)$$

$with(LinearAlgebra):$
$N := 9:$
$a := 1:$
$b := 2:$
$\text{alpha} := \frac{1}{2}:$
$\text{beta} := \ln(2):$
$h := 'h':$
$X := Vector(N, i \to a + i \cdot h):$

$$A := \frac{1}{h^2} \cdot Matrix(N,\ (i, j) \to `if`(i = j,\ -2,\ `if`(\text{abs}(i - j) = 1,\ 1,\ 0)));$$

$$p := i \to -\frac{4}{X[i]}:$$

$$P := \frac{1}{2 \cdot h} \cdot Matrix(N,\ (i, j) \to `if`(\text{abs}(i - j) = 1,\ p(i) \cdot (j - i),\ 0));$$

$$q := i \to -\frac{2}{X[i]^2}:$$

$$Q := Matrix(N,\ (i, j) \to `if`(i = j,\ q(i),\ 0));$$

$$M := A - P - Q;$$

$$r := i \to \frac{2 \cdot \ln(X[i])}{X[i]^2}:$$

$$R := Vector(N,\ (i, j) \to r(i)):$$

$$R[1] := R[1] - \frac{\text{alpha}}{h^2} - \frac{p(1) \cdot \text{alpha}}{2 \cdot h}:$$

$$R[-1] := R[-1] - \frac{\text{beta}}{h^2} + \frac{p(N) \cdot \text{beta}}{2 \cdot h}:$$

$R;$

$$h := \frac{(b - a)}{N + 1};$$

$evalf(R);$
$Y := LinearSolve(evalf(M), evalf(R)):$
$Y;$
$plot1 := plot(X, Y, style = point, color = blue):$

$$f := x \to \frac{4}{x} - \frac{2}{x^2} + \ln(x) - \frac{3}{2}:$$

$plot2 := plot(\text{f(x)}, x = 1..2):$
$plots[display](plot1, plot2);$

$residuals := \text{abs}(Y - Vector([seq(evalf(\text{f(X[i])}), i = 1..N)]));$