# Lecture 11: Euler's Method Continuation (02/04/2026)

$$y' = f(x, y), \quad y(x_0) = y_o$$

Solve this equation numerically

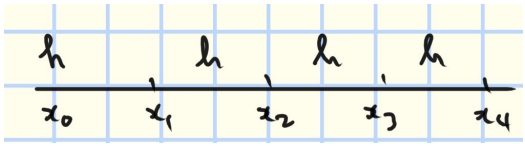


Figure 7: Diagram

$h =$ step size

$x_0, x_1, x_2, x_3, \ldots$ : grid points

We want to find or approximate $y(x_0), y(x_1), y(x_2), \ldots$

substitute $x = x_k$ into the differential equation.

$$y'(x_k) = f(x_k, \underbrace{y(x_k)}_{\approx y_k})$$

$$\frac{y(x_{k+1}) - y(x_k)}{x_{k+1} - x_k} \approx f(x_k, y_k)$$

$$\frac{y_{k+1} - y_k}{h} \approx f(x_k, y_k)$$

$$y_{k+1} - y_k \approx h f(x_k, y_k)$$

$$\boxed{y_{k+1} \simeq y_k + h f(x_k, y_k)}$$

(recursive formula)