

2.2 Numerische Lösung:

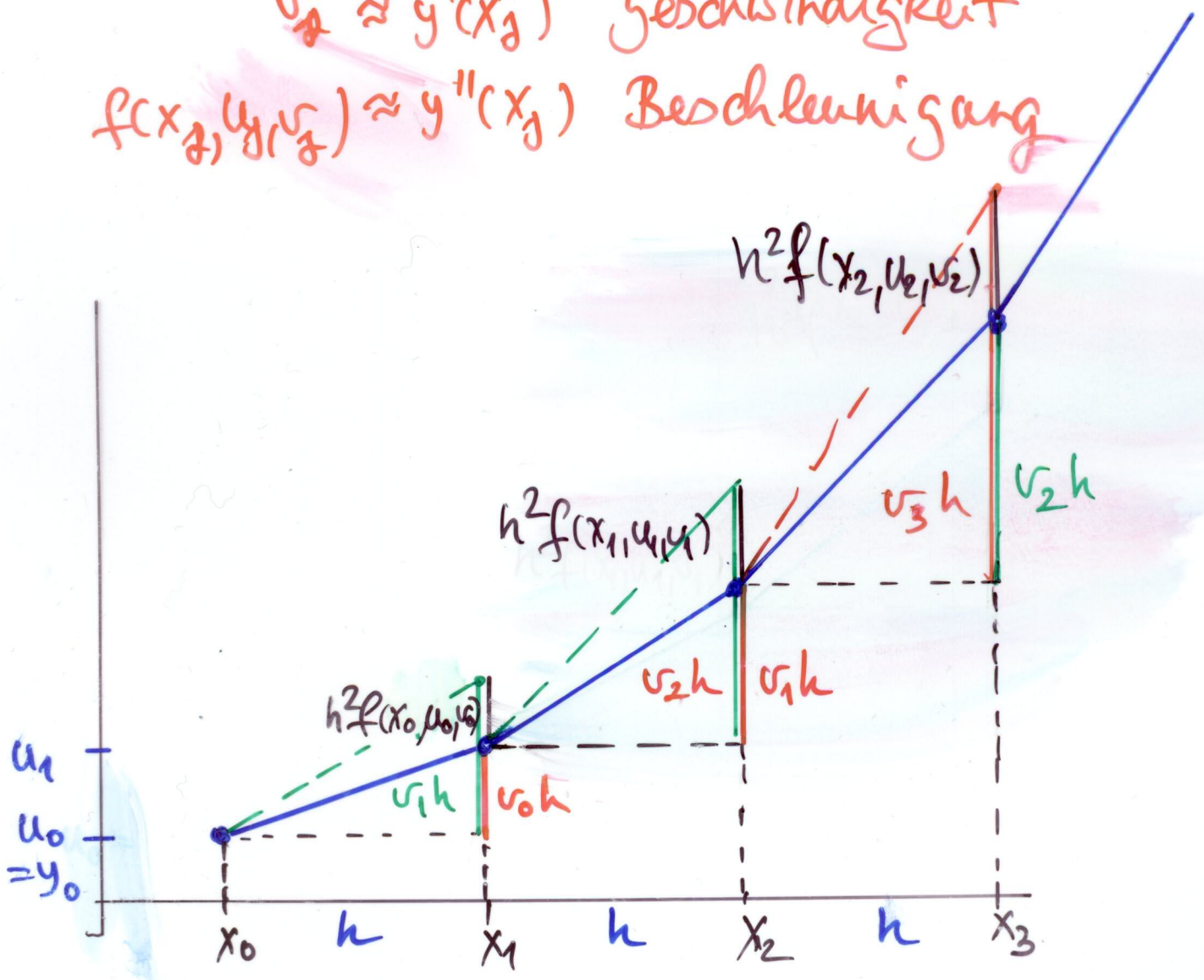
Differenzenverfahren

$$y'' = f(x, y, y') \quad , \quad y(x_0) = y_0 \quad , \quad y'(x_0) = y_1$$

$u_j \approx y(x_j)$ Ort

$v_j \approx y'(x_j)$ Geschwindigkeit

$f(x_j, u_j, v_j) \approx y''(x_j)$ Beschleunigung



$$u_0 = y_0, \quad v_0 = y_1, \quad u_{j+1} = u_j + h v_j$$

$$v_{j+1} = v_j + h f(x_j, u_j, v_j)$$

④

$$y'' = y' - \frac{1}{x}y + \frac{2-x^2}{(1+x)^2} \quad y(0) = y'(0) = 0$$

$$y = x \ln(1+x)$$

$$y' = \ln(1+x) + \frac{x}{1+x}$$

$$u_0 = v_0 = 0, \quad h = 1/3, \quad u_{j+1} = u_j + \frac{1}{3}v_j$$

$$v_{j+1} = v_j + \frac{1}{3} \left[v_j - \frac{u_j}{j/3} + \frac{2 - (j/3)^2}{(1 + j/3)^2} \right]$$

$$j = 0, 1, 2, 3, 4$$

