

$\frac{1}{c}$ RUNGE-KUTTA METHOD (ONE-STEP) ! ORDER 4

$$f(y) = 2y(t) = 2e^t$$

$$\mu_{n+1} = \mu_n + \frac{h}{6}(k_1 + 2k_2 + 2k_3 + k_4)$$

$$k = ?$$

$$\begin{matrix} k_1 & = & \dots \\ k_2 & = & \dots \\ k_3 & = & \dots \\ k_4 & = & \dots \end{matrix}$$

$$\begin{aligned} k_1 &= f(\mu_n) = \dots \\ k_2 &= f(\mu_n + \frac{h}{2} k_1) = \dots \\ k_3 &= f(\mu_n + \frac{h}{2} k_2) = \dots \\ k_4 &= f(\mu_n + h k_3) = \dots \end{aligned}$$

$$\begin{aligned} \mu_1 &= \mu_0 + \frac{h}{6} \left(\underbrace{f(\mu_0)}_{k_1} + \dots \right. \\ &\quad \dots + 2 \cdot \left(\underbrace{f(\mu_0 + \frac{h}{2} f(\mu_0))}_{k_2} + \dots \right. \\ &\quad \dots + 2 \cdot \left(\underbrace{f(\mu_0 + \frac{h}{2} (f(\mu_0 + \frac{h}{2} f(\mu_0))))}_{k_3} + \dots \right. \\ &\quad \left. \left. \left. f(\mu_0 + h \left(\underbrace{f(\mu_0 + \frac{h}{2} (f(\mu_0 + \frac{h}{2} f(\mu_0))))}_{k_3} \right)}_{k_4} \right) \right) \right) \end{aligned}$$