

Time Integration

• backward Euler

$$y' = t \times \exp(-2t) \quad y_0 = 4$$

$$dt = 0.5$$

$$y_{n+1} = y_n + dt \cdot y'_{n+1}$$

$$t_0 = 0 \quad y_0 = 4$$

$$t_1 + dt = 0.5 \quad t_1 = 0.5$$

$$\begin{aligned} y_1 &= y_0 + dt \cdot y'_1 \\ &= 4 + 0.5 (0.5 \times \exp(-2(0.5))) \\ &= 4.09 \end{aligned}$$

$$\begin{aligned} t_2 = 1 \quad y_2 &= y_1 + dt \cdot y'_2 \\ &= 4.09 + 0.5 (1 \times \exp(-2(1))) \\ &= 4.16 \end{aligned}$$

$$\begin{aligned} t_3 = 1.5 \quad y_3 &= y_2 + dt \cdot y'_3 \\ &= 4.16 + 0.5 (1.5 \times \exp(-2(1.5))) \\ &= 4.20 \end{aligned}$$
