

## Multistep Method

$$\dot{y} = e^{-t} - y^2 \quad w_0 = y(0) = 0 \quad \text{at } t = 1 \\ h = 0$$

use AB and bootstrap with 2<sup>nd</sup> order method:

bootstrap using Ralston:

$$f(t_0, w_0) = f(0, 0) = 1$$

$$f(t_0 + \frac{2}{3}h, w_0 + \frac{2}{3}h \cdot f(t_0, w_0)) = f(0.3333; 0.3333) = 0.6054$$

$$\begin{aligned} w_1 = y(0.5) &= w_0 + \frac{1}{4}h \left( f(t_0, w_0) + 3f(t_0 + \frac{2}{3}h, w_0 + \frac{2}{3}h \cdot f(t_0, w_0)) \right) \\ &= 0 + \frac{1}{4} \cdot 0.5 \cdot (1 + 3 \cdot 0.6054) \\ &= \underline{0.3520} \end{aligned}$$

AB:  $t_1 = 0.5$

$$\begin{aligned} y(1) = w_2 &= w_1 + \frac{h}{2} \cdot (3f(t_1, w_1) - f(t_0, w_0)) \\ &= 0.3520 + \frac{0.5}{2} \cdot (3 \cdot f(0.5, 0.3520) - f(0, 0)) \\ &= 0.3520 + \frac{1}{4} \cdot (3 \cdot 0.4826 - 1) \end{aligned}$$

$$y(1) = \underline{\underline{0.4640}}$$