One can (easily) show, that Heun's method has order of accuracy $p=2$.

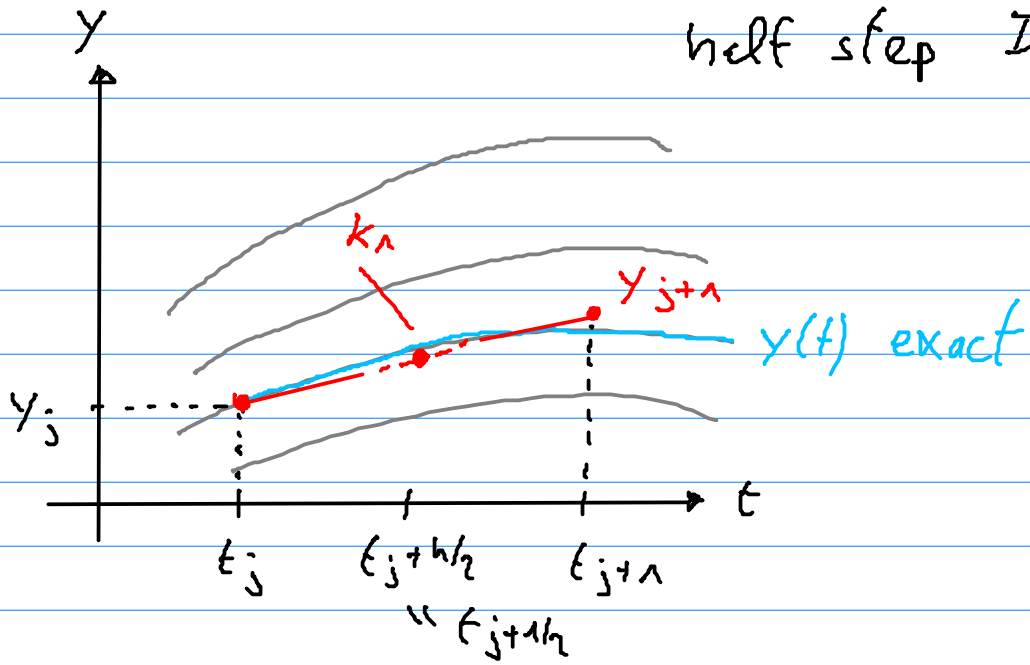
So far we have used the EE to estimate the slopes...

Let's try with IE:

$$y_{j+1} = y_j + h \cdot f\left(t_j + h/2,\ \tilde{y}_{j+1/2}\right)$$

with $\tilde{y}_{j+1/2} = y_j + \frac{h}{2} \cdot f\left(t_j + h/2,\ \tilde{y}_{j+1/2}\right)$

half step IE!



This method is known as the implicit midpoint method (IM):

$$k_1 = f\left(t_j + h/2,\ y_j + \frac{h}{2} k_1\right)$$

$$y_{j+1} = y_j + h \cdot k_1$$