<u>Ex.:</u> (11) BTs for methods seen so far
$\rightsquigarrow$ Slides (RK Methods)

(12) Comparison of RK methods on IVP of Ex. (6) $\rightsquigarrow$ Slides (RK Methods)

<u>Rem.:</u> (i) For explicit methods the RK matrix A is lower triangular

$$A = \begin{pmatrix} 0 & & & \\ a_{21} & \ddots & & 0 \\ \vdots & & \ddots & \\ a_{s1} & \cdots & & 0 \end{pmatrix}$$

(ii) For system: replace y, f by $\vec{y}, \vec{f}$

There is indeed a tight connection between RK methods and quadrature. To see this, let's have a look at the LTE:

$$e_{j+1} \overset{\text{Def.}}{=} y(t_{j+1}) - \left(y(t_j) + h \cdot \sum_{i=1}^{s} b_i \cdot k_i \right)$$

$$= \underbrace{y(t_{j+1}) - y(t_j)} - h \cdot \sum_{i=1}^{s} b_i \cdot k_i$$

$$= \int_{t_j}^{t_{j+1}} \dot{y}(t)\, dt - h \cdot \sum_{i=1}^{s} b_i \cdot k_i$$

ODE

$$= \int_{t_j}^{t_{j+1}} f(t, y(t))\, dt - h \cdot \sum_{i=1}^{s} b_i \cdot k_i$$

QW $\quad$ $f(\ldots)$