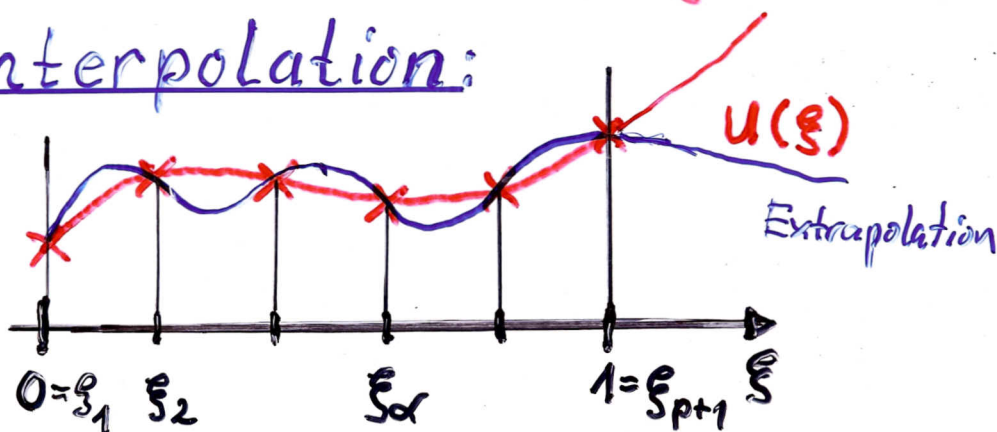


# Bem.: zur Anwendung der Lagrange Interpolationspolynome

## a) Interpolation:



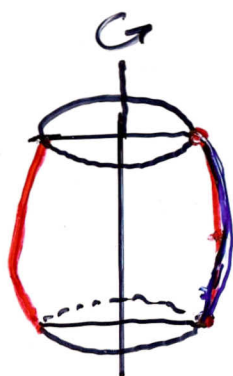
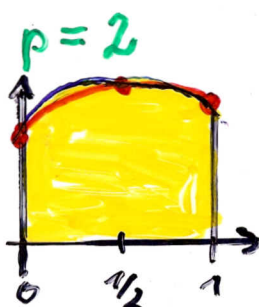
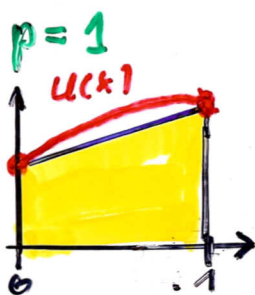
$$\tilde{u}(\xi) := \sum_{\alpha=1}^{p+1} \underset{\substack{\times \\ u(\xi_\alpha)}}{u_\alpha} \Phi_\alpha(\xi) \approx u(\xi)$$

## b) Numerische Integration: Newton-Cotes-Formeln

$$\begin{aligned} \int_0^1 u(\xi) d\xi &\approx \int_0^1 \tilde{u}(\xi) d\xi = \sum_{\alpha=1}^{p+1} u(\xi_\alpha) \underbrace{\int_0^1 \Phi_\alpha(\xi) d\xi}_{=: w_\alpha} \\ &= \sum_{\alpha=1}^{p+1} u(\xi_\alpha) w_\alpha \end{aligned}$$

$\uparrow$  Stützstellen       $\uparrow$  Gewichte

Bsp. 1



## Trapezregel

$$\xi_1 = 0 : w_1 = \int_0^1 (1-\xi) d\xi = 1/2$$

$$\xi_2 = 1 : w_2 = \int_0^1 \xi d\xi = 1/2$$

$$\int_0^1 u(\xi) d\xi \approx \frac{1}{2} (u(0) + u(1))$$

## Keplersche Faßregel

$$\xi_1 = 0 : w_1 = \int_0^1 (2\xi^2 - 3\xi + 1) d\xi = \frac{1}{6}$$

$$\xi_2 = 1/2 : w_2 = \int_0^1 (-4\xi^2 + 4\xi) d\xi = \frac{4}{6}$$

$$\xi_3 = 1 : w_3 = \int_0^1 (2\xi^2 - 5\xi + 1) d\xi = \frac{1}{6}$$

$$\int_0^1 u(\xi) d\xi \approx \frac{1}{6} (u(0) + 4u(1/2) + u(1))$$