3. 3D C^0 – elements:
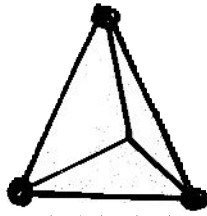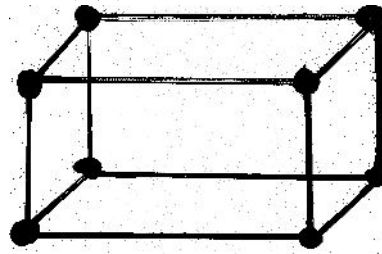

Linear tetrahedrial elements
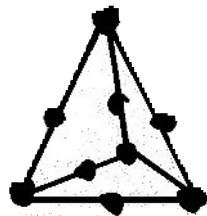$\mathcal{F}(\Delta) = P_1$
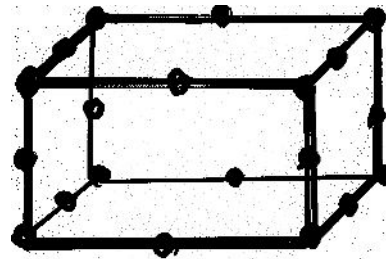
trilinear hexahedrial elements
$\mathcal{F}(\Delta) = Q_1$

HK24
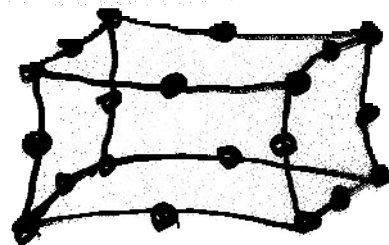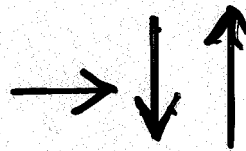

quadratic tetrahedrial element

quadratic
SEREDIPITY
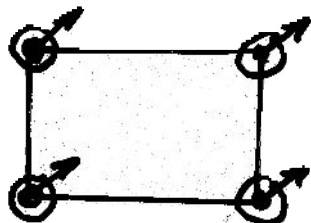element
HK60

$P_2 \subset \mathcal{F}(\Delta) \subset Q_2$

$$x = \sum_{\alpha \in A} x^{(\alpha)} p^{(\alpha)}(\xi) \rightarrow \downarrow \uparrow$$
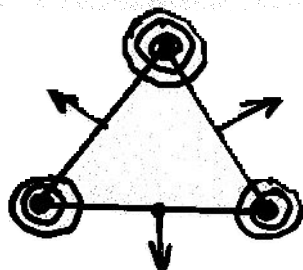
isoparametric
quadratic
SEREDIPITY
element

4. Higher Smoothness, e.g. C^1-elements for 4th-order PDEs

(a) HERMITE-Element : $\mathcal{F}(\Delta) = Q_3$

$$u_q^{(c)} \approx \begin{cases} u & \text{for } q=(0,0) \\ u_x & \text{for } q=(1,0) \\ u_y & \text{for } q=(0,1) \\ u_{xy} & \text{for } q=(1,1) \end{cases}$$

(b) ARGYRIS-ŽENYŽEK - Element : $\mathcal{F}(\Delta) = P_5$

$u, u_x, u_y, u_{xx}, u_{xy}, u_{xx}$
$u_n = \frac{\partial u}{\partial n}$

21 dofs