

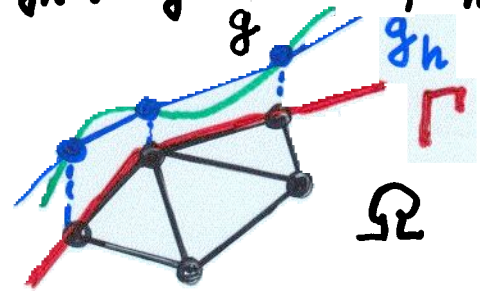
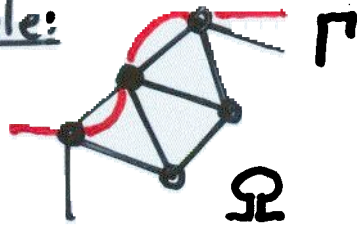
■ The practice often forces us to violate the standard approach (= variational principle):

⇒ Variational Crimes:

1. Numerical Integration: $\int \rightarrow \sum$
 $\mathcal{I}_h(1)_h: a(\cdot, \cdot) \rightarrow a_h(\cdot, \cdot)$ 5
 $\langle F, \cdot \rangle \rightarrow \langle F_h, \cdot \rangle_h$ 4 $\downarrow (1)_h$

2. 1st Kind BC cannot always be fulfilled precisely in V_h ,
 i.e. $V_{0h} \not\subset V_0$ X and/or $V_{gh} \not\subset V_g$ X even if $V_h \subset V$!

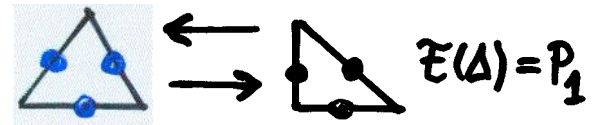
Example:



3. Conformity of the elements is violated:

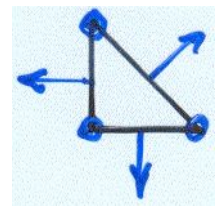
(in particular, for 4th order PDEs: $V = H^2(\Omega)$!),
 i.e. $V_h \not\subset V$ 1 (e.g. the use of C^0 -el. for 4th order PDEs)

Examples: a) 2nd order PDEs: Crouzeix-Raviart-el.



b) 4th order PDEs: Morley-element

$F(\Delta) = P_2$



4. Assumptions (33)_{2a)+2b)} 6 have to be completed by additional conditions imposed on the discrete bilinear form $a_h(\cdot, \cdot)$
 ⇒ (34) resp. (39) !