3.2.28 Problem: By introducing barycentric coordinates $\lambda_0, \ldots, \lambda_3$ for a tetrahedron $T \subset \mathbb{R}^3$ and the quartic bubble

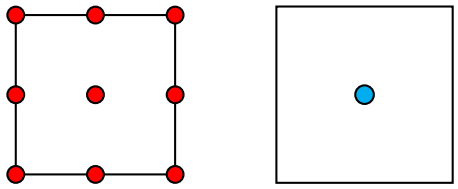
$$b_{4,T} = \lambda_0\lambda_1\lambda_2\lambda_3, \tag{4}$$

show that the MINI element has a natural generalization to three dimensional problems.

3.2.40 Problem: Show that the quadrilateral element

$$V_h = H_h^1(\mathbb{Q}_2)^2 \cap V, \qquad Q_h = H_h^0(\mathbb{P}_0) \cap Q, \tag{5}$$

with degrees of freedom



is inf-sup stable. Does the proof translate to the $P_2 - P_0$ element on tetrahedra or the $Q_2 - P_0$ element on hexahedra?

3.2.63 Problem: Prove Lemma 3.2.62