3.2.68 Problem: Prove Lemma 3.2.67. Furthermore, prove that under the assumption that there is a finite set of reference macro elements $\widehat{M}_i$, such that all macro elements in a family are equivalent to one of them, the estimate holds with a uniform constant $\beta > 0$.

4.2.8 Problem: Verify Lemma 4.2.7.

4.1.14 Problem: Show the following result. Let $p \in H^1(\Omega)$ and $\Delta p \in L^2(\Omega)$. Then, $\partial_n p \in H^{-1/2}(\partial\Omega)$ and

$$(\nabla p, \nabla q) = -(\Delta p, q) + \langle \partial_n p, q \rangle_{\partial\Omega} \quad \forall q \in H^1(\Omega).$$

4.1.20 Problem: In both the primal and the dual mixed formulation, we ignored inhomogeneous essential boundary conditions. Show that the usual lifting method applies. Determine the modified equations and the spaces needed for the liftings.