

Self-assessment test #2
1TD254: Finite element methods II, 5.0 hp

Præparatus supervivet

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1. **True/False:** Let $f(x) = (1 - x)(1 + x)$. Then according to the trapezoidal rule,

$$\int_{-1}^1 f(x) dx \approx 0.$$

2. **True/False:** For an orthonormal basis, the mass-matrix is the identity.
3. **True/False:** The following problem

$$\begin{aligned} -u_{xx} &= f, & x \in I = (0, 1), \\ u_x(0) &= u_x(1) = 0, \end{aligned}$$

is well-posed.

4. **True/False:** The orthogonal projection P_h onto the space V_h can be shown to minimize the absolute error $\max_x |f(x) - P_h f(x)|$.
5. **True/False:** Suppose $a(\cdot, \cdot)$ is symmetric and that $u \perp v$ in the sense of $a(\cdot, \cdot)$. Then $a(u + v, u + v) = a(u, u) + a(v, v)$.
6. **True/False:** Fix a $u \in V$. Suppose $a(\cdot, \cdot)$ is a bounded bilinear form. Then

$$v \mapsto a(u, v)$$

defines a continuous functional.