



Norwegian University of Science and
Technology
Department of Mathematical
Sciences

TMA4310 Optimal
control of PDEs
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Exercise set 6

Reading:

Section 2.8. You may skim-read the subsections 2.8.3-2.8.4. Also skim-read Section 2.9 in [Tr].

Recommended exercises:

1. In Lemma 2.21, the following fact is used: suppose that f is a convex Gâteaux differentiable function on an open set U containing a convex set C . Then, $\forall \bar{u}, u \in C : f(u) - f(\bar{u}) \geq f'(u)(u - \bar{u})$. Provide the proof of this statement.
2. Look at the Example on p. 64. Why is $f(u)$ not Gâteaux differentiable in $L^2(a, b)$ at $\bar{u} = 1$? Is it Gâteaux differentiable in $L^2(a, b)$ at any point?
3. 2.13, 2.15, 2.16.