Relevant reading suggestions.

Below, relevant reading for each exercise is suggested with references to useful equations in the course book "Introduction to the finite element method", unless otherwise, it is stated.

Exercises to chapter 3:

Exercise 3.1 Read p. 28-34.

- For a), see Eqs. (3.13-3.14).
- For b), see especially Figure 3.7 and Eqs. (3.13-3.14)

Exercise 3.3 See p. 36

Exercise 3.5 See Eq. (2.67) on p. 23

Exercise 3.8 b) See pages 39-41
c) See p. 46

Exercises to chapter 4:

4.1 a)-c) See (p. 48-51)

d) See (p. 56-57)

e) See (p. 59)

4.3 (same as pages as for **4.1)**

4.3 a) See (p. 52)

4.5 a) See (p. 54-55)

Exercises to chapter 5:

Exercise 5.1: Section 5.1 about gradients (p.65-69). Especially useful is the conclusion about orthogonality of gradient and contour curve on p.68, together with the definition of the gradient in Eq. (5.2).

Exercise 5.2: Hand-out material about line integrals. In c), Eq. (5.19) is useful.

Exercise 5.3: Hand-out material about line integrals. In b), Eq. (5.18), showing that $d\mathcal{I}$ is a positive quantity, is useful.

Exercise 5.4: p.70-73, explaining the Gauss' divergence theorem. In c), make use of Gauss' divergence theorem, Eq. (5.23).

Exercise 5.5: p.74-75, explaining the Green-Gauss theorem. Show that the assumptions in the exercise ($q_\gamma=0$ and $\phi= \phi(x)$) results in Eq. (4.30) (exercise 5.5 a) and Eq. (4.32) (exercise 5.5 b).

Exercises to chapter 6:

Exercise 6.1a: Section 5.1 about contour curves (p.67).

Exercise 6.1b: Section 6.1 (p.78).

Exercise 6.1c: See (p.5) in the chapter 5 OH-material on determining normal vectors. (On the course homepage)

Exercise 6.1d-f: See (p.78-79) about the generalized Fourier´s law.

Exercise 6.2a-b: Section 6.2 about strong form of 2D heat equation (p.81-83).

Exercise 6.2c-d: Section 6.3 about weak form of 2D heat equation (p.85-86).

Exercises to chapter 7:

Exercise 7.1: Section 7.2.1 about linear one-dimensional elements (p.98-101).

Exercise 7.2: Section 7.2.3 about general one-dimensional elements (p.115-117).

Exercise 7.3: Section 7.2.1 about linear one-dimensional elements (p.103-106).

Exercise 7.4: Section 7.3.1 about linear triangular elements (p.118-123).

Exercise 7.5: Section 7.3.2 about four-node rectangular elements (p.126-130).

Exercise 7.7: Section 7.3.3 about more complicated rectangular and triangular elements (p.131-133). Pascal's triangle, p.97.

Exercise 7.11-12: Section 7.4 about three-dimensional elements.

Exercises to chapter 9:

Exercise 9.1: Section 9.1 on global FE-formulation (p.157-164)

b) use exercise 7.1

c) use exercise 7.2

d) use exercise 7.3, alternatively, use exercise 7.1 together with the assembling procedure described in section 9.3 (p.184-188) (The alternatives are described in Example 1 and Example 4 respectively)

f) see p.178

h) section 9.1.6 on point sources (p.177-178), use eq. 9.73

i) section 9.6 on convection (p.198-199), use eq. 9.147

Exercise 9.2: Calfem manual: example 2 in section 9.3, "Analysis of one-dimensional heat flow"

Exercise 9.3: Section 9.4 on FE-formulation for an axially loaded bar

Exercise 9.4: Start from the weak form obtained in exercise 4.5 b)

Exercise 9.5: Section 9.5 on C^0-continuity (p.202)