

Math 454 - Spring 2025 - Homework 12

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Status - Reading Assignments:

Here are the reading assignments to be completed before the first one of this HW.

SCF2 (Shreve – Stoch. Calculus for Finance, II Textbook):

Ch. 1 – 4

MF454 lecture notes:

Ch.2 – 13.6

Other:

Stewart Single Variable Calculus ch.3.9 (Antiderivatives) for examples of (ordinary) differential equations.

New reading assignments:

In the following: • MF = MF454 = my course lecture notes • SCF2 = Shreve: Stochastic Calculus for Finance II

• WMS = Wackerly, et al = standard Math 447 Textbook

Reading assignment 1 - due Monday, April 7:

- a. Carefully read MF ch.14. Skip the proof of Lemmas 14.2 and 14.3.

Reading assignment 2 - due: Wednesday, April 9:

- a. Read SCF2 ch.5.1 – 5.4. The material has previously been covered in MF ch.13.

Reading assignment 3 - due Friday, April 11:

- a. Read SCF2 ch.5.4. The material has previously been covered in MF ch.13. This is not an easy read.
- b. Read the parts of SCF2 ch.5.5 – 5.6 that are discussed in in MF ch.14.

Written assignments:

Written assignment 1: Start with formula (9.4): $d\vec{S}_t \bullet d\vec{H}_t + \vec{S}_t \bullet d\vec{H}_t = 0$
to derive the formula (10.6): $dV_t^H = \vec{H}_t \bullet d\vec{S}_t$ for a self-financing portfolio.

Written assignment 2: Write from memory the definition of the Black–Scholes market model. Most important: the dynamics dB_t and dS_t , including the finance meaning of α, σ, r .

Written assignment 3: Derive formula (10.16) (Proposition 10.1) closed book. Then work open book, line by line, through the derivation of (10.17).

Written assignment 4: Work open book (SCF2(!), ch.4.5.1), line by line, through the proof of Proposition 10.2.