9.1 (L10.13) (Barley hedge) Farmer Ville Virtanen has a crop of barley that will be ready for harvest and sale in 3 months. The size of the crop is 150kg. Virtanen is worried about possible price changes, so he is considering hedging. There is no futures contract available for barley, but there is futures contract for wheat. His son, Kalle, recently studied minimum-variance hedging and suggests it as a possible approach. Currently the spot prices are $0.20 €$ per kilo for wheat and $0.30 €$ for barley. The standard deviations of the prices of both wheat and barley are about 20% per year, and the correlation coefficient between them is about 0.7. What is the minimum-variance hedge for farmer Virtanen, and how effective is this hedge as compared to no hedge?

9.2 (L10.14) (Opposite hedge variance) Assume that cash flow is given by $y = S_T W + (F_T - F_0)h$. Let $\sigma_S^2 = \text{Var}[S_T], \sigma_F^2 = \text{Var}[F_T]$, and $\sigma_{ST} = \text{Cov}[S_T, F_T]$.
In an equal and opposite hedge, h is taken to be an opposite equivalent euro value of the hedging instrument. Therefore $h = -kW$, where k is the price ratio between the asset and the hedging instrument. Express the standard deviation of y with the equal and opposite hedge in the form

$$\sigma_y = W \sigma_S \times B.$$

(That is, find B.) What does B represent?

9.3 (L10.10) (Specific vanilla) Suppose the current term structure of interest rates is (0.070, 0.073, 0.077, 0.081, 0.084, 0.088). A plain vanilla interest rate swap will make payments at the end of each year equal to the floating short rate that was posted at the beginning of that year. A 6-year swap having a notional principal of 10 million $€$ is being configured.
a) What is the value of the floating rate portion of the swap?
b) What rate of interest for the fixed portion of the swap would make the two sides of the swap equal?