Problem 1 Do problem 4 in Section 5 p. 86 in Willmott

Problem 2 Imagine that you are the writer of a European call option which expires at time T with exercise price E. The price process for the underlying asset is assumed to be

$$dS = \mu S dt + \sigma S dB_t,$$

where B_t is standard one-dimensional Brownian motion. Let the safe asset be described by $dX_0 = rX_0 dt$.

Let $V(S,t)$ be the price of the option based on the optimal continuous hedging strategy. Assume now that you are allowed to hedge only at specific times $0 < t_1 < \ldots < t_N < T$. Discuss the possible portfolios $\theta_0, \theta_1, t > 0$ with corresponding value $V' = \theta_0 X_0 + \theta_1 S$. Give an expression for the expected risk

$$\sqrt{E\left[(V(S,t) - (\theta_0 X_0 + \theta_1 S))^2\right]}.$$

In particular, determine the qualitative behavior of the risk as $\Delta t = \max_i(t_{i+1} - t_i)$ tends to zero.