Mathematical Finance

Exercise sheet 13

Assume a Black-Scholes model and consider the Merton problem

$$\text{maximize} \quad E\left[U\left(x + (\varphi \bullet S)_T\right)\right] \text{ over } \varphi \in \mathcal{A}(x). \tag{1}$$

Exercise 13.1 Assume $U(x) = -e^{-\gamma x}$, $\gamma > 0$, and solve (1) using the dual method.

Exercise 13.2 Assume $U(x) = \frac{x^\gamma}{\gamma}$, $0 < \gamma < 1$, and solve (1) using the dual method.

Exercise 13.3 Assume $U(x) = \log(x)$ and solve (1) using the dual method.

Exercise 13.4 (Python) Plot the paths of the wealth process for the exponential, power and logarithmic utility.