Asset Pricing Theory Problem Set 3

Due: Next lecture

1. Assume that we have a money account and a stock, (M_t, S_t),

$$\begin{aligned} dM_t &= r_t M_t dt \\ dS_t &= \mu(S_t)dt + \sigma(S_t)dW_t, \end{aligned}$$

show that under no-arbitrage condition, the price process for an European call option on the stock with strike price K and expiration date T must satisfy:

$$F_2(x,t) + r_t x F_1(x,t) + \frac{1}{2}\sigma(x)^2 F_{11}(x,t) - r_t F(x,t) = 0$$

with the boundary condition

$$F(x,T) = \max(x - K, 0).$$