Problem set 1

Due date: October 3 at noon.

Exercise 1

Derive a formula for the price $O(t, S_1(t), S_2(t))$ of an **Outperformance option**, whose payout is

$$max\left\{0, \frac{S_1(T)}{S_1(0)} - \frac{S_2(T)}{S_2(0)}\right\} \tag{1}$$

the stocks S_1 and S_2 pay no dividends and follow the stochastic processes

$$dS_1 = \mu_1 S_1 dt + \sigma_1 S_1 dW_1 \tag{2}$$
$$dS_2 = \mu_2 S_2 dt + \sigma_2 S_2 dW_2 \tag{3}$$

with $E[dW_1 dW_2] = \rho dt$.

$S_1(0)$ and $S_2(0)$ are the stock prices at time 0 and should be treated as constants. Follow the same logic as for the pricing of the exchange option, done in class.