UCLA Anderson School of Management

Quizz #2

You have 45 minutes to finish this assignment. Please write legibly. You may use a cheat sheet as specified in the syllabus. No laptops or equipment that allows communication are allowed. Only a simple calculator.

Problem 1. Suppose that the stock follows the dynamics

$$dS_t = \mu S_t^{\delta} dt + \sigma S_t^{\gamma} d\overline{W}_t$$

and that the interest rate is constant and equal to r. Provide the Partial differential equation and the boundary condition for a European call option with strike price K and expiry date T. Derive the dynamics of S_t under the probability measure Q.

Problem 2. The stock follows the following dynamics:

$$dS_t = \mu S_t dt + \sigma S_t d\overline{W}_t, \ \mu \text{ and } \sigma \text{ constant.}$$

Assume that at time 0 the price of the stock is S_0. Find the time-0 price of a forward contract that expires at time T. Suppose that the interest rate is equal to r_1 until time $\frac{T}{2}$ and then equal to r_2 until T.

Problem 3. Make the Black Scholes pricing assumptions, i.e., a constant interest rate and the following dynamics for the stock:

$$dS_t = \mu S_t dt + \sigma S_t d\overline{W}_t, \ \mu \text{ and } \sigma \text{ constant.}$$

Assume that at time 0 the price of the stock is S_0. Find the arbitrage-free price of a European call option with strike price K expiring at time T. Suppose that the stock pays a dividend equal to $\delta_1 S_{\frac{T}{3}^-}$ at time $\frac{T}{3}^-$ and equal to $\delta_2 S_{\frac{2}{3}T^-}$ at time $\frac{2}{3}T^-$.