

Test 2

Name:

Derived points:

Problem 1. Consider American put option without maturity (*perpetual American put*). Let V be the price function. Why does function V satisfy the following condition:

$$V(S) \geq \max(K - S, 0),$$

where K is strike price?

Problem 2. Write down Black-Scholes differential equation for the European call option.

Problem 3. Please give definition of \mathcal{V} (5 points) and find its value in the Black-Scholes market (5 points).

Problem 4. Give the Stochastic Differential Equation describing the short term return rate r_t in the Vasicek model (5 points) and identify its solution (5 points).

Problem 5. Consider two sides, A and B, that signed the following contract. A invests K in the financial instrument that gives return rate R . After time T A pays B the amount $K_A - K$ where K_A is a investment value of A after time T . Similarly, B invests K in the financial instrument with stochastic return rate r_t and pays its value after time T to A. Find the swap rate R .