Test 2

Name:

Derived points:

Problem 1. Please give definition of Δ (5 points) and find its value in the Black-Scholes market (5 points).

Problem 2. Derive the Black-Scholes equation for the European call option price on the stock S which pays dividend continuously with intensity D.

Problem 3. Let V be price of *perpetual American put*. It satisfies the following equation:

$$\frac{1}{2}\sigma^2 S^2 \frac{\mathrm{d}^2 V}{\mathrm{d}S^2} + rS\frac{\mathrm{d}V}{\mathrm{d}S} - rV = 0$$

if S follows Black-Scholes model. Find V using definition and some properties of the American option.

Problem 4. Write the stochastic differential equation for the short term return rate r_t in the Merton model.

Problem 5. Give the pay-off function for any digital option.