

M3A22 MOCK MASTERY QUESTION 2014

- (i) Give the stochastic differential equation for the price $S = (S_t)$ of a risky asset in the continuous-time Black-Scholes model.
- (ii) Give also its solution.
- (iii) Describe the sample paths of this solution.
- (iv) Write down the formula for the price of a European call with strike K , expiry T and riskless interest rate r . Describe without proof how to deduce the Black-Scholes formula.
- (v) Is this model complete? Give reasons.
- (vi) Why is hedging a portfolio in a continuous-time Black-Scholes model problematic? (You may quote that Brownian motion $W = (W_t)$ has finite quadratic variation t .)
- (vii) How might these problems be circumvented?

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