

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

DEPARTMENT OF MATHEMATICS & STATISTICS

AS498 - Section 01 (Term 172)

Date: April 03, 2018

Test 3

Duration: 50 minutes

Family Name: _____ ID #: 201_____0 Serial #: ____

Consider the Black-Scholes framework. You are given:

- (i) $S(t)$ is the time t -price of the underlying stock, with $S(0) = 50$.
- (ii) The stock pays dividends at a rate proportional to its price. The dividend yield is 2%.
- (iii) The stock's rate of appreciation is 16%.
- (iv) The stock's volatility is 20%.
- (v) The continuously compounded risk-free interest rate is 5%.

1. Calculate the expectation, standard deviation and median of $S(0.25)$. **(12 points)**

2. Construct a 95% lognormal prediction interval for $S(0.25)$.

(4 points)

3. Find the probability that a European call option with strike price of 55 and a maturity date in three months will be exercised.

(4 points)

4. Find the Sharp ratio of the stock.

(4 points)

5. Calculate the price, delta and gamma of a 3-month 55-strike European call option on the stock. **(8 points)**

6. Calculate the price, delta and gamma of a 3-month 45-strike European put option on the stock. **(8 points)**

7. Calculate the elasticity of the put option defined above.

(5 points)

8. Calculate the instantaneous volatility of the call option defined above.

(5 points)