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Exam II: Mathematical Foundations of Risk Measurement - 2015 Edition

PRMIA 8007

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QUESTION NO: 1

Consider an investment fund with the following annual return rates over 8 years: +6%, -6%,

+12%, -12%, +3%, -3%, +9%, -9% .

What can you say about the annual geometric and arithmetic mean returns of this investment fund?

A. The arithmetic mean return is zero and the geometric mean return is negative

B. The arithmetic mean return is negative and the geometric mean return is zero

C. The arithmetic mean return is equal to the geometric mean return

D. None of the above

ANSWER: A

QUESTION NO: 2

The first derivative of a function f(x) is zero at some point, the second derivative is also zero at this point. This means that:

A. f has necessarily a minimum at this point

B. f has necessarily a maximum at this point

C. f has necessarily neither a minimum nor a maximum at this point

D. f might have either a minimum or a maximum or neither of them at this point

ANSWER: D

QUESTION NO: 3

What is the probability of tossing a coin and getting exactly 2 heads out of 5 throws?

A. 8/15

B. 9/23

C. 10/32

D. None of these

ANSWER: C

QUESTION NO: 4

Kurtosis(X) is defined as the fourth centred moment of X, divided by the square of the variance of X. Assuming X is a normally distributed variable, what is Kurtosis(X)?

A. 0

B. 3

C. 2

D. 1

ANSWER: B

QUESTION NO: 5

Every covariance matrix must be positive semi-definite. If it were not then:

A. Some portfolios could have a negative variance

B. It could not be used to simulate correlated asset paths

C. The associated correlation matrix would not be positive semi-definite

D. All the above statements are true

ANSWER: D

QUESTION NO: 6

I have $5m to invest in two stocks: 75% of my capital is invested in stock 1 which has price 100 and the rest is invested in stock 2, which has price 125. If the price of stock 1 falls to

90 and the price of stock 2 rises to 150, what is the return on my portfolio?

A. -2.50%

B. -5%

C. 2.50%

D. 5%

ANSWER: A

QUESTION NO: 7

In a 2-step binomial tree, at each step the underlying price can move up by a factor of u = 1.1 or down by a factor of d = 1/u. The continuously compounded risk free interest rate over each time step is 1% and there are no dividends paid on the underlying. Use the Cox, Ross, Rubinstein parameterization to find the risk neutral probability and hence find the value of a European put option with strike 102, given that the underlying price is currently

100.

A. 5.19

B. 5.66

C. 6.31

D. 4.18

ANSWER: C

QUESTION NO: 8

For the function f(x) =3x-x3 which of the following is true?

A. x = 0 is a minimum

B. x = -3 is a maximum

C. x = 2 is a maximum

D. None of these

ANSWER: D

QUESTION NO: 9

Calculate the determinant of the following matrix:

A. 4.25

B. -4.25

C. 4

D. 2

ANSWER: D

QUESTION NO: 10

Evaluate the derivative of ln(1+ x2) at the point x = 1

A. 0.5

B. 0

C. 1

D. 2

ANSWER: C