PRMIA

Exam 8002

PRM Certification - Exam II: Mathematical Foundations of Risk Measurement

Version: 6.0

[Total Questions: 132]

Question No : 1

A 2-step binomial tree is used to value an American put option with strike 104, given that the underlying price is currently 100. At each step the underlying price can move up by 20% or down by 20% and the risk-neutral probability of an up move is 0.55. There are no dividends paid on the underlying and the discretely compounded risk free interest rate over each time step is 2%. What is the value of the option in this model?

A. 11.82
B. 12.33
C. 12.49
D. 12.78

Answer: C

Question No : 2

Which of the following statements concerning class intervals used for grouping of data is correct?

When grouping data, attention must be paid to the following with regards to class intervals:

1. Class intervals should not overlap

2. Class intervals should be of equal size unless there is a specific need to highlight data within a specific subgroup

3. The class intervals should be large enough so that they not obscure interesting variation within the group

A. Statements 2 and 3 are correct
B. Statements 1 and 2 are correct
C. All three statements are correct
D. Statements 1 and 3 are correct

Answer: B

Question No : 3

Consider the following distribution data for a random variable X: What is the mean and variance of X?

A. 3.6 and 7.15
B. 3.4 and 3.84
C. 3.5 and 3.45
D. None of these

Answer: D

Question No : 4

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 : 5

Which statement regarding the matrix below is true?

A. It is not positive definite
B. It is positive semi-definite
C. It is positive definite
D. It is negative definite

Answer: A

Question No : 6

The correlation between two asset returns is 0.5. What is the largest eigenvalue of their

correlation matrix?

A. 0.5
B. 1
C. 1.5
D. None of the above

Answer: C

Question No : 7

In statistical hypothesis tests, 'Type I error' refers to the situation in which…

A. The null hypothesis is accepted when in fact it should have been rejected
B. The null hypothesis is rejected when in fact it should have been accepted
C. Both null hypothesis and alternative hypothesis are rejected
D. Both null hypothesis and alternative hypothesis are accepted

Answer: B

Question No : 8

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 : 9

Identify the type and common element (that is, common ratio or common difference) of the following sequence: 6, 12, 24

A. arithmetic sequence, common difference 2
B. arithmetic sequence, common ratio 2
C. geometric sequence, common ratio 2
D. geometric sequence, common ratio 3

Answer: C

Question No : 10

Which of the following can induce a 'multicollinearity' problem in a regression model?

A. A large negative correlation between the dependent variable and one of the explanatory variables
B. A high positive correlation between the dependent variable and one of the explanatory variables
C. A high positive correlation between two explanatory variables
D. The omission of a relevant explanatory variable

Answer: C

Question No : 11

Let a, b and c be real numbers. Which of the following statements is true?

A. The commutativity of multiplication is defined by
B. The existence of negatives is defined by
C. The distributivity of multiplication is defined by
D. The associativity of multiplication is defined by

Answer: C

Question No : 12

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 : 13

Which of the following statements about variance and standard deviation are correct?

1. When calculated based on a sample of the population data, one has to correct for any bias in the result by using the number of degrees of freedom in the calculation

2. Variance is in square root units of the underlying data, whereas standard deviation is in units of the underlying data

3. When considering independent variables, variance is additive, while standard deviation is not

A. All three statements are correct
B. Statements 1 and 2 are correct
C. Statements 1 and 3 are correct
D. Statements 2 and 3 are correct

Answer: C

Question No : 14

At what point x does the function f(x) = x3 - 4x2 + 1 have a local minimum?

A. -0.666666667
B. 0
C. 2.66667

D. 2

Answer: C

Question No : 15

Consider two functions f(x) and g(x) with indefinite integrals F(x) and G(x), respectively. The indefinite integral of the product f(x)g(x) is given by

A. F(x)G(x)
B. F(x)g(x) + f(x)G(x)
C. F(x)g(x) - F(x)g'(x)dx
D. f(x)G(x) - F(x)g'(x)dx

Answer: C

Question No : 16

The gradient of a function f(x, y, z) = x + y2 - x y z at the point x = y = z = 1 is

A. (0, 2, 1)
B. (0, 0, 0)
C. (1, 1, 1)
D. (0, 1, -1)

Answer: D

Question No : 17

Let N(.) denote the cumulative distribution function of the standard normal probability distribution, and N' its derivative. Which of the following is false?

A. N(0) = 0.5
B. N'(0) 0
C. N(x) 0 as x
D. N'(x) 0 as x

Answer: C

Question No : 18

When calculating the implied volatility from an option price we use the bisection method and know initially that the volatility is somewhere between 1% and 100%. How many iterations do we need in order to determine the implied volatility with accuracy of 0.1%?

A. 10
B. 100
C. 25
D. 5

Answer: A

Question No : 19

A linear regression gives the following output:

Figures in square brackets are estimated standard errors of the coefficient estimates.

What is the value of the test statistic for the hypothesis that the coefficient of is less than 1?

A. 0.32
B. 0.64
C. 0.96
D. 1.92

Answer: B

Question No : 20

Which of the following is not a sequence?

A. , , , … , , …
B. , , , , …
C. , , , , , , …

D. 30

Answer: D

Question No : 21

You are given the following values of a quadratic function f(x): f(0)=0, f(1)=-2, f(2)=-5. On the basis of these data, the derivative f'(0) is …

A. in the interval]-2.5,-2[
B. equal to -2
C. in the interval]-2,+[
D. in the interval]-,-2.5]

Answer: C

Question No : 22

Which of the following statements is not correct?

A. Every linear function is also a quadratic function.
B. A function is defined by its domain together with its action.
C. For finite and small domains, the action of a function may be specified by a list.
D. A function is a rule that assigns to every value x at least one value of y.

Answer: D

Question No : 23

Which of the following properties is exhibited by multiplication, but not by addition?

A. associativity
B. commutativity
C. distributivity
D. invertibility

Answer: C