

PRMIA

8002

Exam II: Mathematical Foundations of Risk Measurement

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Question: 1

For a quadratic equation, which of the following is FALSE?

- A. If the discriminant is negative, there are no real solutions
- B. If the discriminant is zero, there is only one solution
- C. If the discriminant is negative there are two different real solutions
- D. If the discriminant is positive there are two different real solutions

Answer: C

Question: 2

The natural logarithm of x is:

- A. the inverse function of $\exp(x)$
- B. $\log(e)$
- C. always greater than x , for $x > 0$
- D. 46

Answer: A

Question: 3

When a number is written with a fraction as an exponent, such as $a^{b/c}$, which of the following is the correct computation?

- A. Take the square-root of 75 and raise it to the 5th power
- B. Divide 75 by 2, then raise it to the 5th power
- C. Multiply 75 by 2.5
- D. Square 75, then take the fifth root of it

Answer: A

Question: 4

You invest \$2m in a bank savings account with a constant interest rate of 5% p.a. What is the value of the investment in 2 years time if interest is compounded quarterly?

- A. \$2,208,972
- B. \$2,210,342
- C. \$2,205,000
- D. None of them

Answer: A

Question: 5

Solve the simultaneous linear equations: $x + 2y - 2 = 0$ and $y - 3x = 8$

- A. $x = 1, y = 0.5$
- B. $x = -2, y = 2$
- C. $x = 2, y = 0$
- D. None of the above

Answer: B

Question: 6

Find the roots, if they exist in the real numbers, of the quadratic equation

- A. 4 and -2
- B. -4 and 2
- C. 1 and 0
- D. No real roots

Answer: D

Question: 7

The sum of the infinite series $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \dots$ equals:

- A. 12
- B. Infinity
- C. 128
- D. 20

Answer: B

Question: 8

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

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

Answer: C

Question: 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: 10

What is the sum of the first 20 terms of this sequence: 3, 5, 9, 17, 33, 65,...?

- A. 1 048 574
- B. 1 048 595
- C. 2 097 170
- D. 2 097 172

Answer: C

Question: 11

What is the simplest form of this expression: $\log_2(165/2)$

- A. 10
- B. 32
- C. $5/2 + \log_2(16)$
- D. $\log_2(5/2) + \log_2(16)$

Answer: A

Question: 12

For each of the following functions, indicate whether its graph is concave or convex:

$Y = 7x^2 + 3x + 9$

$Y = 6 \ln(3x)$

$Y = \exp(-4x)$

- A. concave, concave, concave

-
- B. concave, convex, convex
 - C. convex, concave, concave
 - D. convex, convex, concave

Answer: C

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