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Module 0 - Entry Exam

IFoA IFoA CAA M0

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QUESTION NO: 1

A biased coin has the following probability distribution function:

$$P(\text{heads}) = 0.80$$

$$P(\text{tails}) = 0.20$$

The biased coin is tossed twice in succession.

Calculate the probability of tossing at least one tail.

- A. 0.20
- B. 0.36
- C. 0.64
- D. 0.80

ANSWER: B

QUESTION NO: 2

An insurance company sells policies where, for each policy, the policyholder pays the first £50 of the cost of any claim. A claim reported to the insurance company takes some unknown value £x.

Identify which of the mathematical expressions below represents the cost in £ to the insurance company of the claim.

- A. $x - 50$
- B. x
- C. $\max(x, 50)$
- D. $\max(x - 50, 0)$

ANSWER: D

QUESTION NO: 3

Identify which of the following involves weak inequality.

- A)

$$(x+1)^n = \sum_k^n \binom{n}{k} x^k$$

B)

$$\max_{0 \leq x \leq 1} x e^{-x^2}$$

C)

$$\lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n$$

D)

$$a^2 b^2 > c^2 + mx$$

- A. Option A
- B. Option B
- C. Option C
- D. Option D

ANSWER: B**QUESTION NO: 4**

The probability density function $f(x)$ for a random variable X is defined over the interval 0 to 1.

$$f(x) = 2(1-x).$$

Calculate the probability that X is greater than 0.5.

- A. 0.25
- B. 0.5
- C. 0.75

D. 1

ANSWER: A

QUESTION NO: 5

Three light bulbs are chosen at random from 15 bulbs of which 5 are known to be defective.

Calculate the probability that exactly one of the three is defective.

A)

$$\frac{1}{3}$$

B)

$$\frac{15}{31}$$

C)

$$\frac{45}{91}$$

D)

$$\frac{33}{65}$$

A. Option A

B. Option B

C. Option C

D. Option D

ANSWER: C

QUESTION NO: 6

Determine which of the options is equal to $\log(3) - 2\log(x+1)$.

A)

$$\log(2x + 1)$$

B)

$$\log\left(\frac{3}{2x + 1}\right)$$

C)

$$\log\left(3(x + 1)^2\right)$$

D)

$$\log\left(\frac{3}{(x + 1)^2}\right)$$

A. Option A

B. Option B

C. Option C

D. Option D

ANSWER: D

QUESTION NO: 7

The variable s can take values between 2 and 6.

Identify which of the inequalities shown can be satisfied by at least one value of s .

A. $s + 5 < 6$

B. $s + 9 < 6$

C. $s - 6 > 2$

D. $s - 2 > 2$

ANSWER: D

QUESTION NO: 8

Determine which of the statements is true about the root(s) of the following equation:

$$x^2 + \sqrt{2}x - 4 = 0$$

- A. There is only one real root which takes a positive value.
- B. There is only one real root which takes a negative value.
- C. There are two real roots, r_1 and r_2 , where r_1 is positive and: $r_1 = -0.5 r_2$
- D. There are two real roots, r_1 and r_2 , where r_1 is positive and: $r_1 = -2 r_2$

ANSWER: C**QUESTION NO: 9**

One of the two solutions to the equation is .

$$\frac{1}{|2 - 7x|} = 3$$

Determine the second solution.

$$\frac{5}{21}$$

A)

$$-\frac{1}{7}$$

B)

$$\frac{3}{14}$$

C)

$$\frac{1}{3}$$

D)

$\frac{5}{7}$

- A. Option A
- B. Option B
- C. Option C
- D. Option D

ANSWER: C

QUESTION NO: 10

Consider the function $f(x) = x^2 - 6x + 20$. This function has a stationary point at $x = 3$.

Determine the nature of this stationary point and how do we know this to be true.

- A. It is a minimum stationary point because the second derivative of the function with respect to x takes the value 2, which is positive.
- B. It is a maximum stationary point because the second derivative of the function with respect to x takes the value 2, which is positive.
- C. It is a maximum stationary point because the value of the function at $x = 3$ is 11, which is positive.
- D. It is a minimum stationary point because the value of the function at $x = 3$ is 11, which is positive.

ANSWER: A