External assessment 2023

Multiple choice question book

Mathematical Methods

Paper 1

General instruction

- Work in this book will not be marked.

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Section 1

Instruction

- Respond to these questions in the question and response book.

QUESTION 1

$e^{\ln(x)}$ is equivalent to

(A) 0

(B) 1

(C) x

(D) $\frac{1}{x}$

QUESTION 2

If $f(x) = e^{6-2x}$, determine the value of $f'(2)$.

(A) e^2

(B) $2e^2$

(C) $-e^2$

(D) $-2e^2$

QUESTION 3

A bag contains 10 buttons of the same shape and size in different colours: 5 blue, 3 green and 2 red.

If 3 buttons are randomly drawn from the bag, which probability can be calculated using the binomial distribution?

(A) P(3 green) with replacement

(B) P(3 blue) without replacement

(C) P(2 green and 1 red) with replacement

(D) P(2 red and 1 blue) without replacement

QUESTION 4

If the gradient of the function $f(x)$ is given by $\frac{20}{x^3}$, then $f(x)$ is equal to

(A) $-\frac{60}{x^4}+c$

(B) $-\frac{5}{x^4}+c$

(C) $-\frac{10}{x^2}+c$

(D) $-\frac{40}{x^2}+c$

QUESTION 5

Determine $\int_1^3 \frac{1}{2x}dx$.

(A) $\frac{1}{2}\ln 6$

(B) $\frac{1}{2}\ln 5$

(C) $\frac{1}{2}\ln 4$

(D) $\frac{1}{2}\ln 3$

QUESTION 6

Substitutions for h are used to estimate the limit of $\frac{a^h-1}{h}$ as $h \to 0$. Which sequence is the most appropriate?

(A) –4, –2, –1, –0.5, –0.25, –0.125 …

(B) –0.05, –0.1, –0.2, –0.4, –0.8 …

(C) 2, 1, 0, –1, –2, –3 …

(D) 1, 2, 3, 4, 5, 6 …

QUESTION 7

Determine the mean of the continuous random variable X with the probability density function

$$f(x)=\begin{cases}\frac{1}{8}x, & 0\le x\le 4\\ 0, & \text{otherwise}\end{cases}$$

(A) $\frac{1}{8}$

(B) $\frac{3}{8}$

(C) $\frac{1}{2}$

(D) $\frac{8}{3}$

QUESTION 8

A sample of size n was used to estimate a population proportion. An approximate margin of error of 3% was calculated using $z = 1.96$. Given the sample proportion was 0.6, determine n.

(A) $n=\dfrac{\left(\frac{0.03}{1.96}\right)^2}{0.24}$

(B) $n=\dfrac{0.24}{\left(\frac{0.03}{1.96}\right)^2}$

(C) $n=\dfrac{\left(\frac{0.03}{1.96}\right)^2}{2.4}$

(D) $n=\dfrac{2.4}{\left(\frac{0.03}{1.96}\right)^2}$

QUESTION 9

Determine $\int_0^3 \pi \sin\left(\frac{\pi}{3}x\right) dx$.

(A) 3

(B) 6

(C) –3

(D) –6

QUESTION 10

The continuous random variable Y has the probability density function

$$f(y) = \begin{cases} 1+y, & 0 \le y \le \sqrt{3}-1 \\ \\ 0, & \text{otherwise} \end{cases}$$

Determine $P(0 \le y \le \frac{1}{2})$.

(A) $\frac{1}{5}$

(B) $\frac{3}{8}$

(C) $\frac{5}{8}$

(D) $\frac{3}{4}$

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