

External assessment 2023

Multiple choice question book

Mathematical Methods

Paper 2

General instruction

- Work in this book will not be marked.

Section 1

Instruction

- Respond to these questions in the question and response book.
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QUESTION 1

If $f(x) = \sin(3x)$, determine the value of $f'\left(\frac{\pi}{8}\right)$.

- (A) 2.772
- (B) 1.148
- (C) 0.929
- (D) 0.383

QUESTION 2

The probability of hitting a bullseye on a standard dartboard is 1 in 1250. What is the probability of hitting a bullseye exactly once in 10 attempts?

- (A) $\binom{9}{1} \left(\frac{1}{1250}\right)^1 \times \left(\frac{1249}{1250}\right)^9$
- (B) $\binom{9}{1} \left(\frac{1}{1250}\right)^9 \times \left(\frac{1249}{1250}\right)^1$
- (C) $\binom{10}{1} \left(\frac{1}{1250}\right)^1 \times \left(\frac{1249}{1250}\right)^9$
- (D) $\binom{10}{1} \left(\frac{1}{1250}\right)^9 \times \left(\frac{1249}{1250}\right)^1$

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QUESTION 3

In a certain normal distribution curve, 95% of the area lies between the values 50.32 and 113.68. The mean of this distribution is 82.

Determine the standard deviation.

- (A) 16.16
- (B) 21.12
- (C) 31.68
- (D) 63.36

QUESTION 4

The displacement (m) of a moving particle is given by $d = e^{0.5t} - 1$, where t is time (s).

The acceleration (ms^{-2}) of the particle when $t = 4$ is

- (A) 7.3891
- (B) 6.3891
- (C) 3.6945
- (D) 1.8473

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QUESTION 5

Solve $\ln(x) + \ln(3.70) = \ln(9.25)$ for x .

- (A) 0.92
- (B) 1.71
- (C) 2.50
- (D) 5.55

QUESTION 6

$\int_a^{5a} \frac{1}{x+a} dx$, $a \neq 0$ is

- (A) 1.7918
- (B) 1.6094
- (C) 1.3863
- (D) 1.0986

QUESTION 7

The distribution of a certain sample proportion has a mean of 0.70 and a standard deviation of 0.02. Determine the sample size.

- (A) 525
- (B) 750
- (C) 1750
- (D) 2500

QUESTION 8

The number of koalas in a conservation park is modelled by $N = 15 \ln(7t + 1)$, $t \geq 1$, where t represents the time (years) since the park opened. There were 20 koalas in the park when it opened.

Determine the approximate rate of change in the number of koalas when $t = 3$.

- (A) 46
- (B) 26
- (C) 25
- (D) 5

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QUESTION 9

If $f(x) = e^{3x}(x+1)^2$ and $f'(x) = ae^{3x}(x+1)$, determine the expression for a .

- (A) $3x + 5$
- (B) $3x + 3$
- (C) $5x + 5$
- (D) $5x + 3$

QUESTION 10

A student is trying to determine which subject they performed best in compared to other students. Results from recent tests in four subjects (A to D) are shown. Assume student results in each subject are normally distributed.

In which subject did the student perform best compared to other students?

	Class mean	Class standard deviation	Student's result
(A)	62	22	77
(B)	55	25	74
(C)	61	15	70
(D)	73	20	82

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