

External assessment 2021

Multiple choice question book

Mathematical Methods

Paper 2 — Technology-active

General instruction

- Work in this book will not be marked.



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Section 1

QUESTION 1

The scores obtained on a test can be assumed to be normally distributed with a mean of 102 and a standard deviation of 19.

What proportion of scores are over 113?

- (A) 0.2813
- (B) 0.5789
- (C) 0.7187
- (D) 0.8216

QUESTION 2

A substance is being heated such that its temperature T in $^{\circ}\text{C}$ after t minutes is given by the function $T = 2e^{0.5t}$

The first integer value of t for which the instantaneous rate of change of temperature is greater than 100°C per minute is

- (A) $t = 10$
- (B) $t = 9$
- (C) $t = 8$
- (D) $t = 7$

QUESTION 3

A random sample of people were surveyed about the most important factor when deciding where to shop. The results appear in the table.

Factor	Percentage (%)
Price	40
Quality of merchandise	30
Service	15
Shopping environment	15

If the sample size was 1200, the approximate 95% confidence interval for the proportion of people who identified price as the most important factor is

- (A) (0.395, 0.405)
- (B) (0.386, 0.414)
- (C) (0.377, 0.423)
- (D) (0.372, 0.428)

QUESTION 4

Using the trapezoidal rule with an interval size of 1, the approximate value of the integral $\int_0^3 0.5^x dx$ is

- (A) 1.25
- (B) 1.26
- (C) 1.31
- (D) 1.88

QUESTION 5

Solve for x given that $\log_3(x-1) = 2$.

- (A) 7
- (B) 8
- (C) 9
- (D) 10

QUESTION 6

When seeds of a certain variety of flower are planted, the probability of each seed germinating is 0.8.

If eight seeds are planted, what is the probability that at least six seeds will germinate?

- (A) 0.797
- (B) 0.503
- (C) 0.294
- (D) 0.001

QUESTION 7

Determine $f(x)$, given $f'(x) = 6x^2 + \frac{1}{x^2} + \frac{1}{x}$ and $f(1) = 5$.

- (A) $f(x) = 2x^3 + \frac{3}{x^3} + \ln(x) - 1$
- (B) $f(x) = 2x^3 - \frac{1}{x} + \ln(x) + 4$
- (C) $f(x) = 2x^3 - \frac{1}{x} + \frac{2}{x^2} + 2$
- (D) $f(x) = 2x^3 + \frac{3}{x^3} + \frac{2}{x^2} - 2$

QUESTION 8

The displacement (in metres) of a particle is given by $s(t) = -3\cos(t) + 2\sin(t)$, where t is in seconds.

The instantaneous velocity of the particle at time $t = \frac{\pi}{2}$ seconds is

- (A) -3 m s^{-1}
- (B) -2 m s^{-1}
- (C) 2 m s^{-1}
- (D) 3 m s^{-1}

QUESTION 9

The graphs of the functions $f(x) = 2e^x + 5$ and $g(x) = \frac{3}{e^x}$ intersect at point A. Determine the coordinates of point A.

- (A) (1.609, 15)
- (B) (1.099, 1)
- (C) (0.4065, 2)
- (D) (-0.693, 6)

QUESTION 10

An object travels in a straight line so that its velocity at time t seconds is given by $v(t) = 2t + \sin(2t)$. Determine the expression for acceleration as a function of time.

- (A) $a(t) = 2 + 2\cos(2t)$
- (B) $a(t) = 2 - \frac{1}{2}\cos(2t)$
- (C) $a(t) = t^2 + 2\cos(2t)$
- (D) $a(t) = t^2 - \frac{1}{2}\cos(2t)$

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