External assessment

Multiple choice question book

Mathematical Methods

Paper 1 — Technology-free

General instruction

- Work in this book will not be marked.

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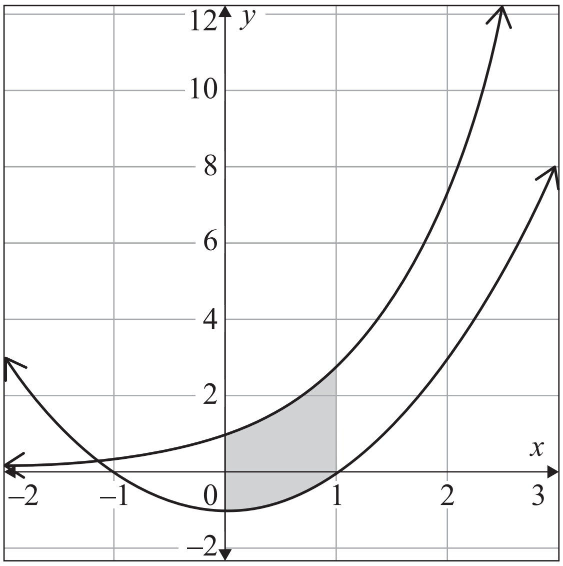
Section 1

QUESTION 1

The graphs of $f(x) = e^x$ and $g(x) = x^2 - 1$ are shown.



The area of the shaded section bounded by these graphs between the lines $x = 0$ and $x = 1$ is

(A) $1 - e$

(B) $e - 2$

(C) $e - \dfrac{5}{3}$

(D) $e - \dfrac{1}{3}$

QUESTION 2

Determine $\displaystyle\int \frac{e^x + 1}{e^x}\,dx$

(A) $x - e^{-x} + c$

(B) $x + e^{-x} + c$

(C) $1 + xe^{-x} + c$

(D) $x + xe^{-x} + c$

QUESTION 3

Determine $2\int (4x+6)^3\,dx$

(A) $16(4x+6)^4 + c$

(B) $8(4x+6)^4 + c$

(C) $\dfrac{(4x+6)^4}{2} + c$

(D) $\dfrac{(4x+6)^4}{8} + c$

QUESTION 4

Pulse rates of adult men are approximately normally distributed with a mean of 70 and a standard deviation of 8.

Which of the following choices correctly describes how to determine the proportion of men that have a pulse rate greater than 78?

(A) Determine the area to the left of $z = 1$ under the standard normal curve.

(B) Determine the area to the right of $z = 1$ under the standard normal curve.

(C) Determine the area to the right of $z = -1$ under the standard normal curve.

(D) Determine the area between $z = -1$ and $z = 1$ under the standard normal curve.

QUESTION 5

The equation of the tangent to the curve $f(t) = te^t$ at $t = 1$ is

(A) $y = et$

(B) $y = 2et - e$

(C) $y = et - e^2 + 1$

(D) $y = 2et - 2e^2 + 1$

QUESTION 6

If the probability of success in a Bernoulli trial is 0.30, the variance is

(A) 0.70

(B) 0.46

(C) 0.30

(D) 0.21

QUESTION 7

The life expectancy (in years) of an electronic component can be represented by the probability density function

$$p(x) = \begin{cases} \dfrac{1}{x^2}, & x \geq 1 \\ 0, & \text{otherwise} \end{cases}$$

The probability that the component lasts between 1 and 10 years is

(A) 0.010

(B) 0.100

(C) 0.900

(D) 0.990

QUESTION 8

A test includes six multiple choice questions. Each question has four options for the answer.

If the answers are guessed, the probability of getting at most two questions correct is represented by

(A) $\binom{6}{0}0.25^0 \times 0.75^6 + \binom{6}{1}0.25^1 \times 0.75^5$

(B) $\binom{6}{0}0.25^0 \times 0.75^6 + \binom{6}{1}0.25^1 \times 0.75^5 + \binom{6}{2}0.25^2 \times 0.75^4$

(C) $1-\left(\binom{6}{0}0.25^0 \times 0.75^6 + \binom{6}{1}0.25^1 \times 0.75^5\right)$

(D) $1-\left(\binom{6}{0}0.25^0 \times 0.75^6 + \binom{6}{1}0.25^1 \times 0.75^5 + \binom{6}{2}0.25^2 \times 0.75^4\right)$

QUESTION 9

Determine $\int \frac{x+1}{x^2+2x}\,dx$

(A) $\ln\left(\frac{1}{2x+2}\right)+c$

(B) $\ln(2x+2)+c$

(C) $\frac{1}{2}\ln(x^2+2x)+c$

(D) $2\ln(x^2+2x)+c$

QUESTION 10

Two types of material (A and B) are being tested for their ability to withstand different temperatures. A random selection of both materials was subjected to extreme temperature changes and then classified according to their condition after they were removed from the testing facility. The results are shown in the table.

	Material		
	A	**B**	**Total**
Broke completely	25	43	68
Showed defects	35	38	73
Remained intact	35	24	59
Total	**95**	**105**	**200**

An approximate 95% confidence interval for the probability that material A will break completely or show defects is given by

$$\left(c - 1.96\sqrt{\frac{c(1-c)}{n}}, c + 1.96\sqrt{\frac{c(1-c)}{n}}\right)$$

The values of c and n are

(A) $\frac{60}{95}$ and 95

(B) $\frac{60}{200}$ and 95

(C) $\frac{140}{200}$ and 95

(D) $\frac{60}{200}$ and 200

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