Sample assessment 2020

Multiple choice question book

Mathematical Methods

Paper 1 — Technology-free

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Section 1

Instructions

- Answer all questions in the question and response book.
- This book will not be marked.

QUESTION 1

The random variable X is binomially distributed with 10 trials and a probability of success equal to 0.25 at each attempt. The value of $P(X \geq 1)$ is equal to

(A) $\left(\frac{1}{4}\right)^{10}$

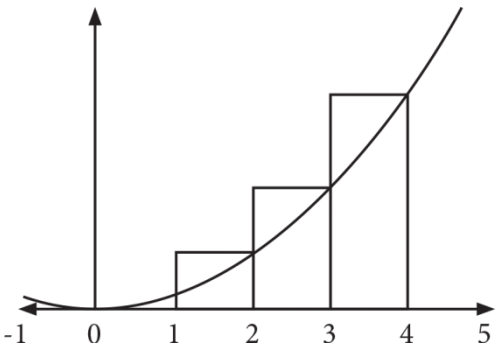
(B) $\left(\frac{3}{4}\right)^{10}$

(C) $1 - \left(\frac{1}{4}\right)^{10}$

(D) $1 - \left(\frac{3}{4}\right)^{10}$

QUESTION 2

The approximate area under the curve $y = 2x^2$ between $x = 1$ and $x = 4$ is found using rectangles (of width equal to one unit) as shown in the diagram.



What is the approximate area found using these rectangles?

(A) 58 units^2

(B) 45 units^2

(C) 42 units^2

(D) 28 units^2

QUESTION 3

If $y = \cos^2(3x)$, then $\frac{dy}{dx} =$

(A) $-6\sin(3x)\cos(3x)$

(B) $-2\sin(3x)\cos(3x)$

(C) $2\ \sin(3x)\cos(3x)$

(D) $6\ \sin(3x)\cos(3x)$

QUESTION 4

If $\int_{-2}^{0} f(x)dx = 4$ and $\int_{0}^{3} f(x)dx = -10$, which of the following is true?

(A) $\int_{-2}^{3} f(x)dx = -14$

(B) $\int_{-2}^{3} f(x)dx = -6$

(C) $\int_{-2}^{3} f(x)dx = 6$

(D) $\int_{-2}^{3} f(x)dx = 14$

QUESTION 5

The slope of the tangent to the graph of $y = \ln(x^2)$ at $x = e^2$ is

(A) $\frac{1}{e^2}$

(B) $\frac{2}{e^2}$

(C) $\frac{4}{e^4}$

(D) $\frac{1}{e^4}$

QUESTION 6

Calculate $\int_{-1}^{7} \frac{dx}{\sqrt{(2+x)}}$

(A) 1

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

(C) 2

(D) 4

QUESTION 7

The distribution of marks in three subjects is given below. The mark received by a student in each of the subjects is also shown.

Subject	Mean	Standard deviation	Student mark
Science	60	15	70
Mathematics	68	6	72
Music	65	9	72

Standardised z-scores were used to compare the results and showed that the student

(A) performed equally well in mathematics and science.

(B) performed equally well in mathematics and music.

(C) performed better in mathematics than in science.

(D) performed better in mathematics than in music.

QUESTION 8

Given $y = 5e^{2x}$, rearrange the function to make x the subject.

(A) $x = \ln\left(\frac{\sqrt{y}}{\sqrt{5}}\right)$

(B) $x = \sqrt{\ln\left(\frac{y}{5}\right)}$

(C) $x = \ln\left(\sqrt{5y}\right)$

(D) $x = \ln\left(\left(\frac{y}{5}\right)^2\right)$

QUESTION 9

An equilateral triangle has side lengths of 9 m. The area of the triangle is

(A) $\frac{81}{4}$ m^2

(B) $\frac{81\sqrt{2}}{4}$ m^2

(C) $\frac{81\sqrt{3}}{4}$ m^2

(D) $\frac{81}{2}$ m^2

QUESTION 10

If the sample size is decreased, but the sample proportion and the confidence level remain the same, the width of the confidence interval

(A) will increase.

(B) will decrease.

(C) remains unchanged.

(D) may increase or decrease.

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