External assessment 2024

Multiple choice question book

Mathematical Methods

Paper 1 — Technology-free

General instruction

- Work in this book will not be marked.

Queensland Government | QCAA Queensland Curriculum & Assessment Authority

Section 1

Instruction

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

QUESTION 1

Determine $\int x^4 dx$

(A) $4x^3 + c$

(B) $5x^5 + c$

(C) $\frac{1}{3}x^3 + c$

(D) $\frac{1}{5}x^5 + c$

QUESTION 2

Determine $\frac{dy}{dx}$ for the function $y = e^{\sin(x)}$

(A) $\cos(x)\, e^{\sin(x)}$

(B) $\sin(x)\, e^{\cos(x)}$

(C) $e^{\sin(x)}$

(D) $e^{\cos(x)}$

QUESTION 3

A sample of size n can be used to obtain a sample proportion $\hat{p}$.

An approximate margin of error for the population proportion can be obtained using the formula

$$E = z\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

If the level of confidence is increased from 95% to 99%, then

(A) the associated z-value would decrease, so E would increase.

(B) the associated z-value would increase, so E would increase.

(C) the associated z-value would decrease, so E would decrease.

(D) the associated z-value would increase, so E would decrease.

QUESTION 4

Simplify $y = 2\ln\left(e^x\right)$

(A) $y = 2x$

(B) $y = 2^x$

(C) $y = \frac{2}{x}$

(D) $y = x^2$

QUESTION 5

Determine $\int_a^b 2\cos(x)\,dx$, where $a = \frac{\pi}{3}$ and $b = \frac{\pi}{2}$

(A) $1 - \frac{\sqrt{3}}{2}$

(B) $\frac{\sqrt{3}}{2} - 1$

(C) $2 - \sqrt{3}$

(D) $\sqrt{3} - 2$

QUESTION 6

Differentiate $y = \ln(x)\cos(x)$ with respect to x.

(A) $\dfrac{\cos(x)}{x}$

(B) $-\dfrac{\sin(x)}{x}$

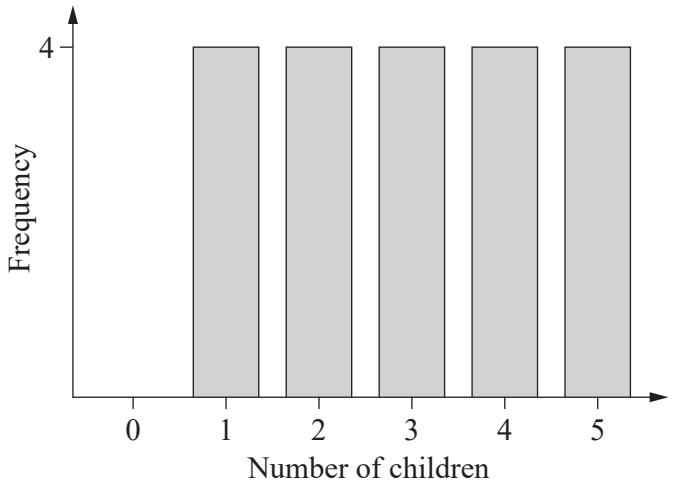
(C) $\dfrac{\cos(x)}{x} + \ln(x)\sin(x)$

(D) $\dfrac{\cos(x)}{x} - \ln(x)\sin(x)$

QUESTION 7

Twenty families are selected to participate in a lifestyle study related to family size.

The number of children in these families is uniformly distributed as shown.



A random sample of five families is chosen from this group, without replacement. A possible mean number of children in the sample is

(A) 5.0

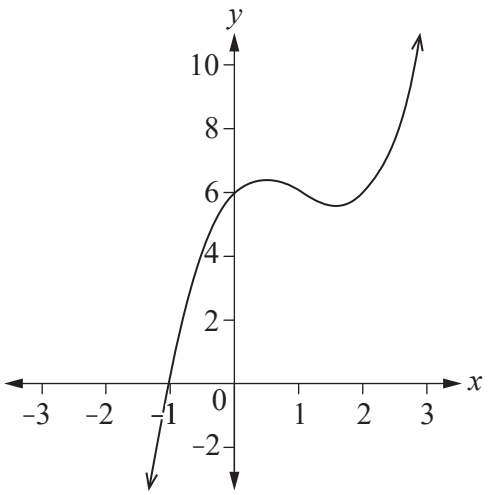
(B) 2.0

(C) 1.0

(D) 0.0

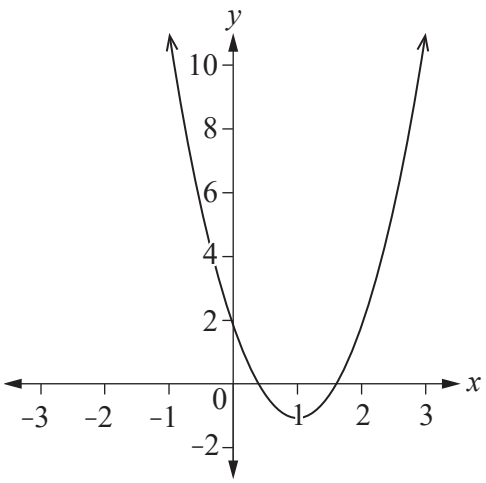
QUESTION 8

The graph of $f(x)$ is shown.

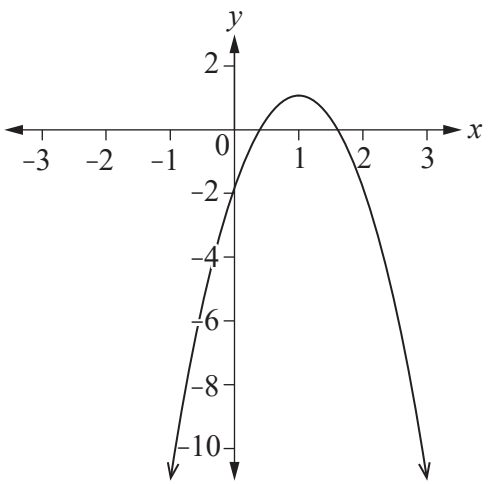


Identify the graph of the second derivative $f''(x)$.

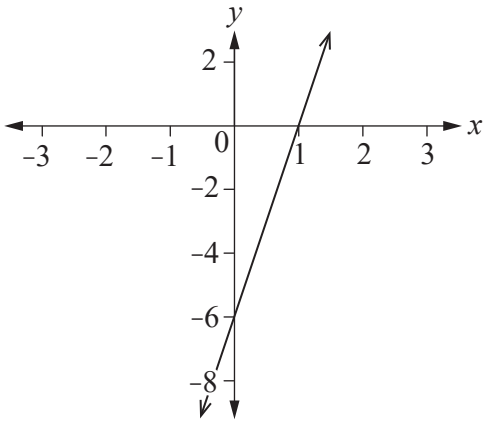
(A)



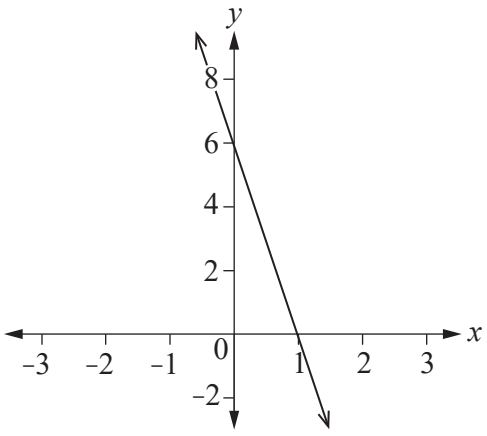
(B)



(C)



(D)



QUESTION 9

At a certain location, the temperature (°C) can be modelled by the function $T = 5\sin\left(\frac{\pi}{12}x\right) + 23$, where x is the number of hours after sunrise.

Determine the rate of change of temperature (°C/hour) when $x = 4$

(A) $\frac{5\pi}{48}$

(B) $\frac{5\pi}{24}$

(C) $\frac{5\pi\sqrt{3}}{24}$

(D) $\frac{5\pi\sqrt{3}}{6}$

QUESTION 10

Given that $\log_{10} 6 = 0.778$, determine the value of $\log_{10} 600$

(A) 77.800

(B) 10.778

(C) 2.778

(D) 1.556

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