External assessment

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 limit of $\frac{12^h - 1}{h}$ as h approaches 0 is closest to

(A) 0.0

(B) 1.0

(C) 2.5

(D) 3.0

QUESTION 2

The pH of a substance is a measure of its acidity and is given by the formula $\text{pH} = -\log_{10}[\text{H}^+]$ where $[\text{H}^+]$ is the concentration of hydrogen ions in moles per litre. If a solution has a pH equal to 0.2, the concentration of hydrogen ions in moles per litre is closest to

(A) 0.32

(B) 0.63

(C) 0.70

(D) 1.58

QUESTION 3

Let R be the region enclosed by the graph of $y = xe^x$, the x-axis, and the lines $x = -1$ and $x = 1$.

The area of R is closest to

(A) 0.74

(B) 1.26

(C) 2.35

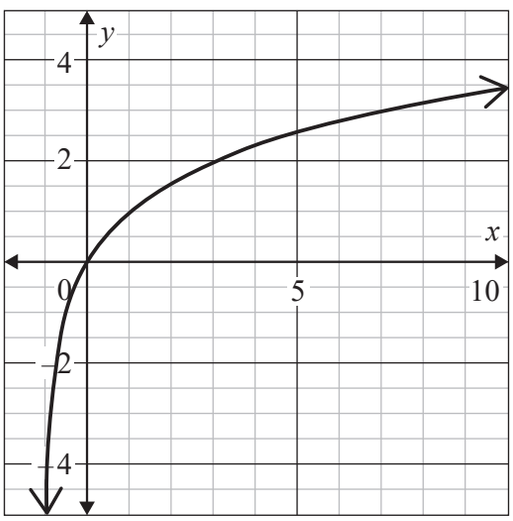
(D) 3.09

QUESTION 4

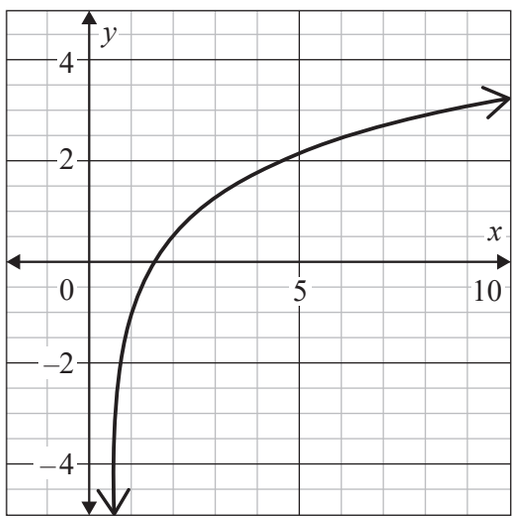
Consider the function $f(x) = \log_p(x+q)$ where $p > 1$ and $0 < q < 1$.

Which of the following could be the graph of $f(x)$?

(A)



(B)



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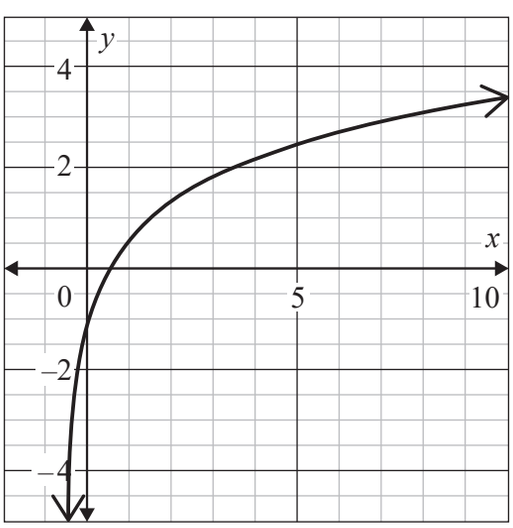

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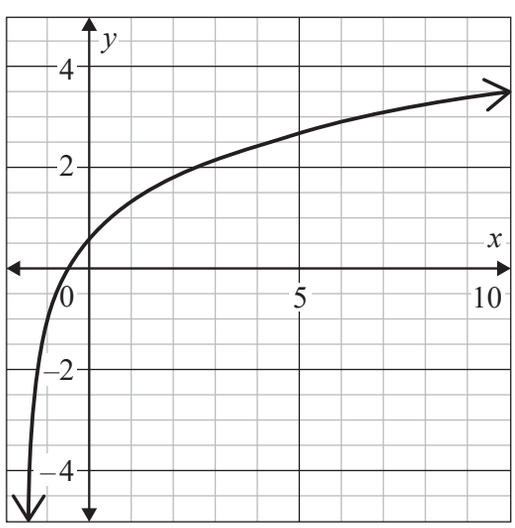


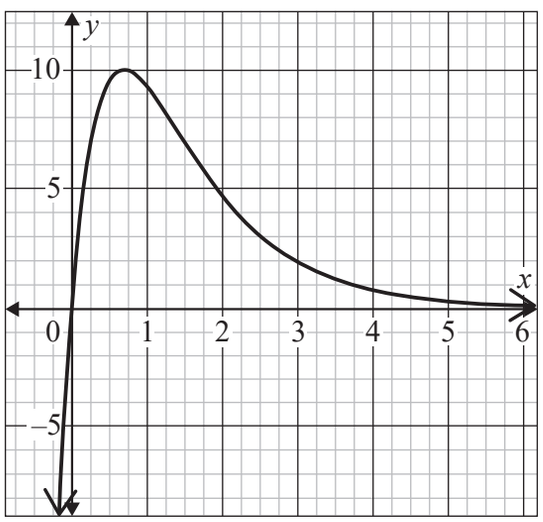
QUESTION 5

An object moves in a straight line with a velocity v given by

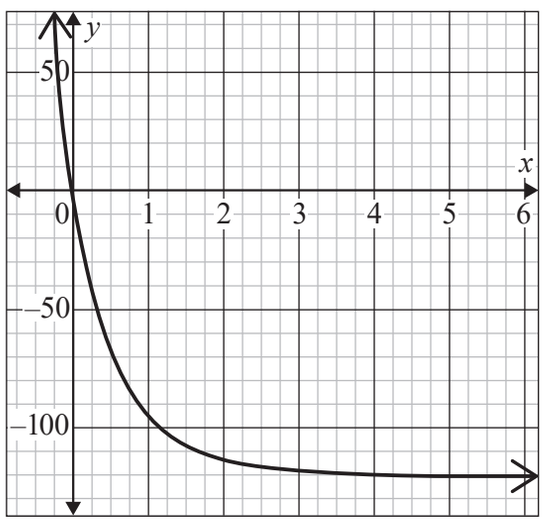
$$v(t) = 40(e^{-t} - e^{-2t}) \text{ m s}^{-1} \text{ where } t \geq 0$$

The object is at the origin initially. The displacement–time graph in the first 6 seconds is

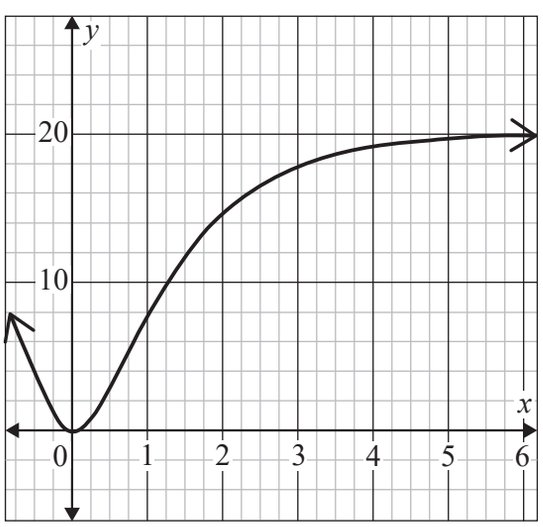
(A)



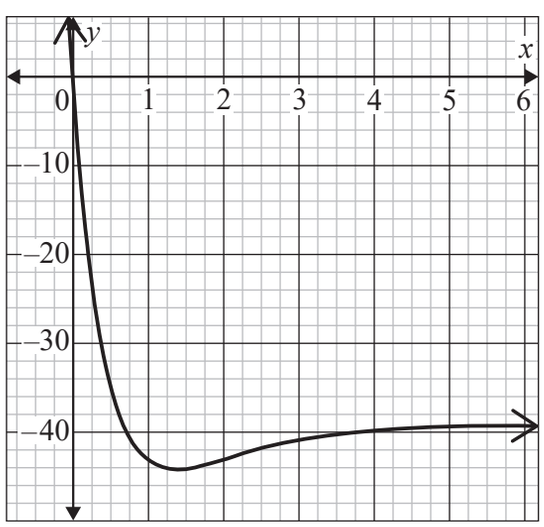
(B)



(C)



(D)



QUESTION 6

Oil is leaking from a tanker at the rate of $r(t) = 9000e^{-0.2t}$ litres per hour, where t is in hours.

Determine how much oil leaks from the tanker (to the nearest litre) from time $t = 0$ to time $t = 10$.

(A) 38 910 litres

(B) 8756 litres

(C) 7782 litres

(D) 1556 litres

QUESTION 7

The records of a shoe manufacturer show that 10% of shoes made are defective.

Assuming independence, the probability of getting 2 defective shoes in a batch of 20 is

(A) 0.1937

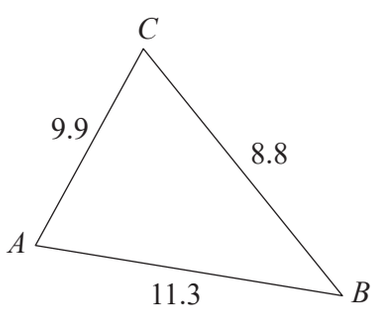
(B) 0.2852

(C) 0.3917

(D) 0.6083

QUESTION 8

Determine the size of angle A in the triangle.



Not drawn to scale

(A) 48.5°

(B) 61.4°

(C) 118.6°

(D) 131.5°

QUESTION 9

The displacement of a particle (in metres) at time t (in seconds) is represented by the function

$$s(t) = t\ln(t) - t,\ 0 < t < 4$$

Determine the approximate acceleration of the particle at time $t = 3$.

(A) 0.66 m s^{-2}

(B) 0.33 m s^{-2}

(C) –0.33 m s^{-2}

(D) –0.66 m s^{-2}

QUESTION 10

The approximate value of x where the graph of the function $y = x^3 + 6x^2 + 7x - 2\cos(x)$ changes concavity is

(A) –3.26

(B) –2.85

(C) –2.20

(D) –1.89

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