External assessment 2022

Multiple choice question book

Mathematical Methods

Paper 1 — Technology-free

General instruction

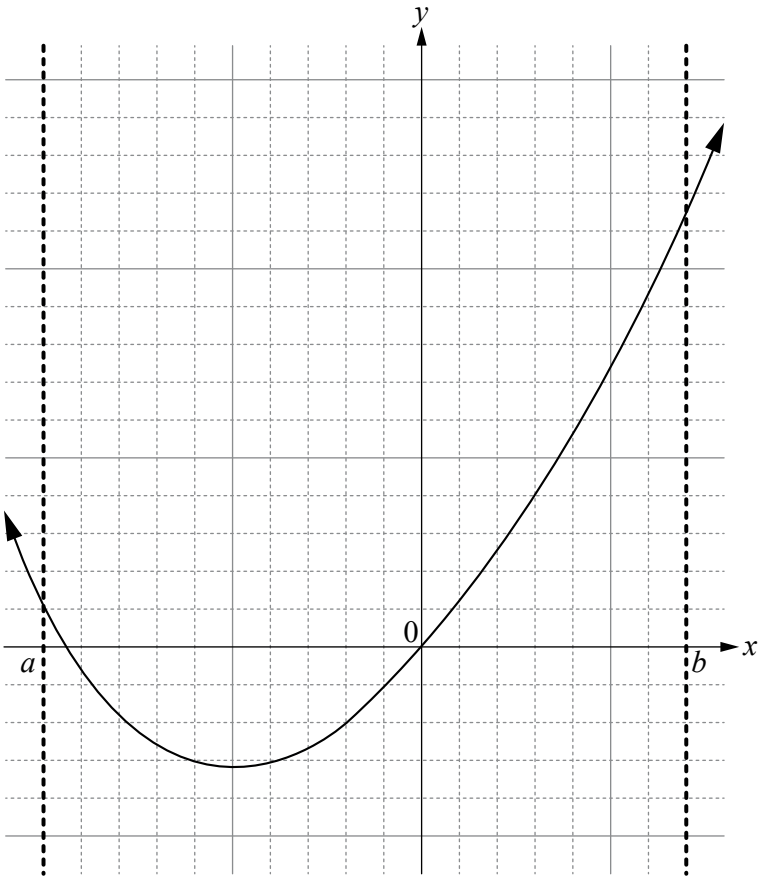
- Work in this book will not be marked.

Queensland Government | QCAA Queensland Curriculum & Assessment Authority

Section 1

QUESTION 1

Consider the graph of $f'(x)$ for $a \le x \le b$.



Which statement describes all the local maxima and minima of the graph of $f(x)$ over $a \le x \le b$?

(A) one local minimum and one local maximum

(B) one local minimum and two local maxima

(C) one local minimum only

(D) one local maximum only

QUESTION 2

A binomial random variable arises from the number of successes in n independent Bernoulli trials.

A context **not** suitable for modelling using a binomial random variable is recording the number of

(A) heads when a coin is tossed 12 times.

(B) left-handed people in a sample of 100 people.

(C) times a player hits a target from 20 shots where each shot is independent of all other shots.

(D) red marbles selected when three marbles are drawn without replacement from a bag containing four blue and five red marbles.

QUESTION 3

The area between the curve $y = 9 - x^2$ and the x-axis is

(A) 12 units^2

(B) 18 units^2

(C) 36 units^2

(D) 54 units^2

QUESTION 4

The weekly amount of money a company spends on repairs is normally distributed, with a mean of \$1200 and a standard deviation of \$100.

Given that $P(Z \leq -2.5) = 0.0062$ and $P(Z > 1) = 0.1587$, where Z is a standard normal random variable, determine the probability that the weekly repair costs will be between \$950 and \$1300.

(A) 0.6525

(B) 0.6587

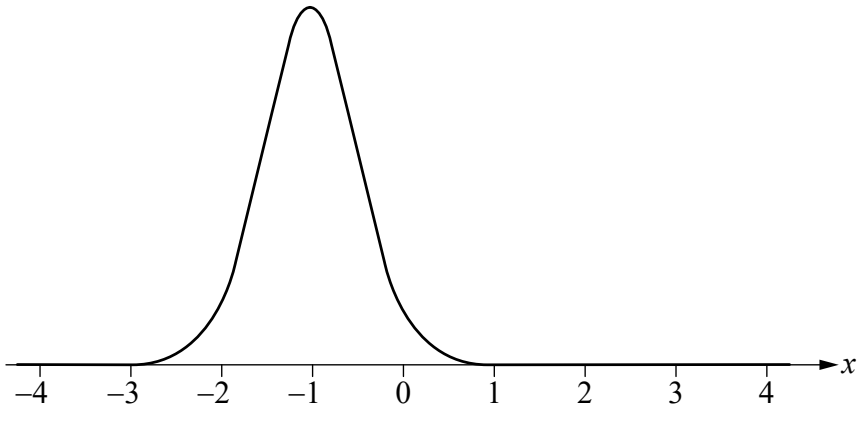
(C) 0.8351

(D) 0.8413

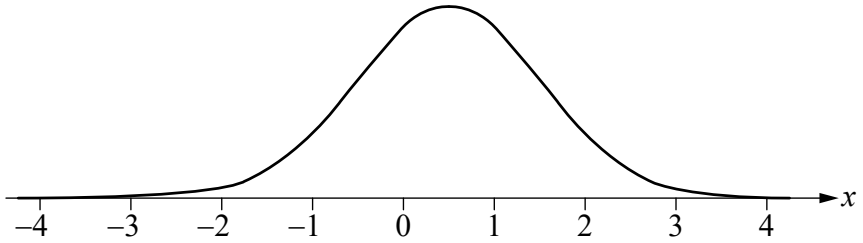
QUESTION 5

Which normal distribution curve best represents a normal distribution with a mean of 1 and a standard deviation of 0.5?

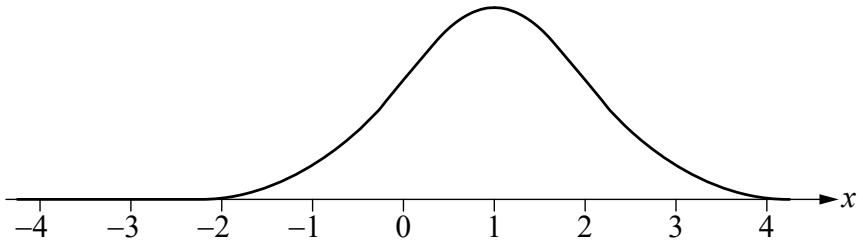
(A)



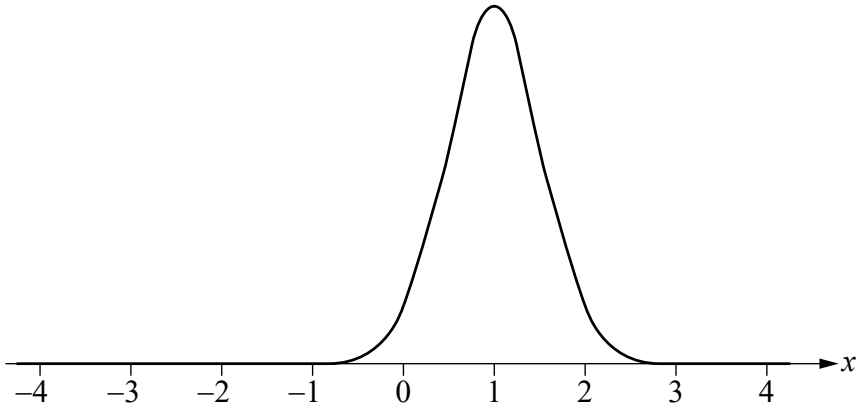
(B)



(C)



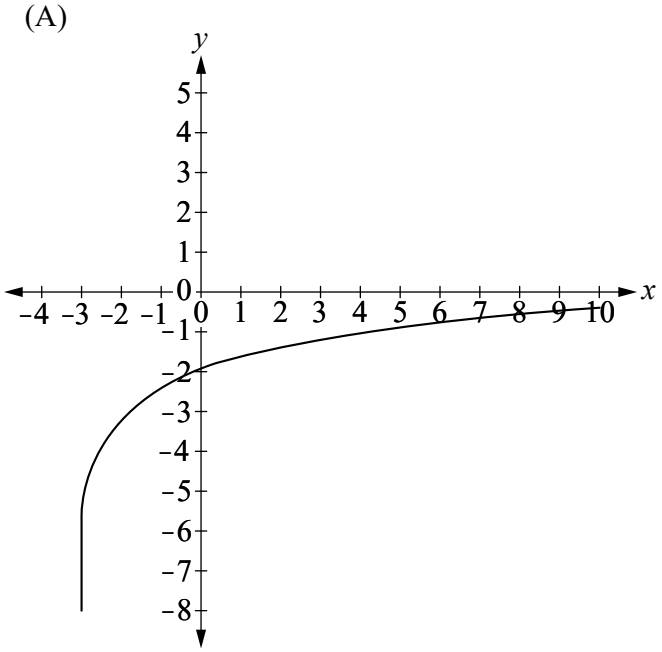
(D)



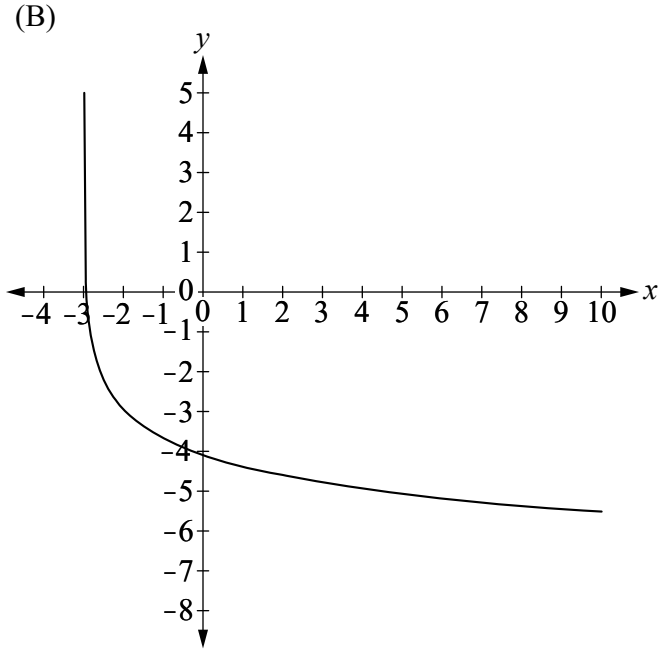
QUESTION 6

Which graph represents the function $f(x) = -3 - \ln(x+3)$?

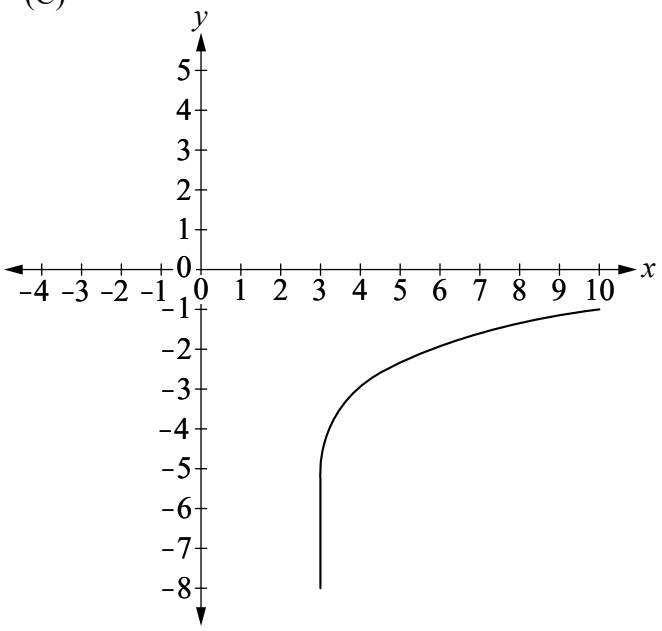
(A)



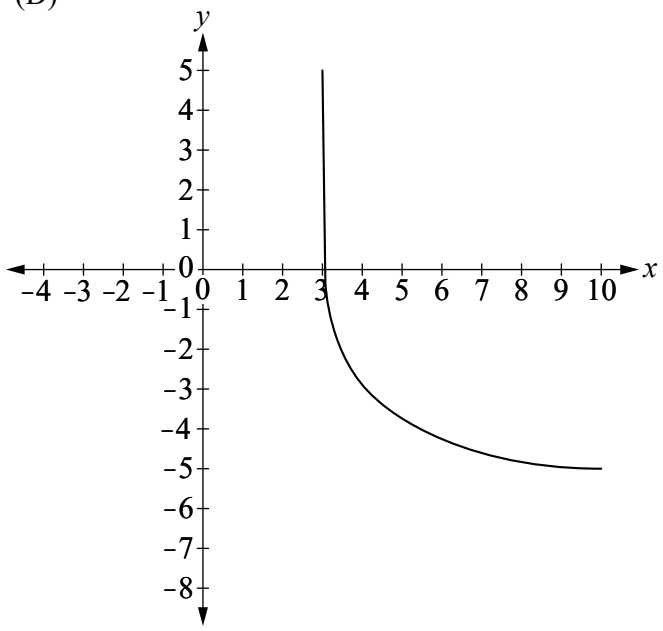
(B)



(C)

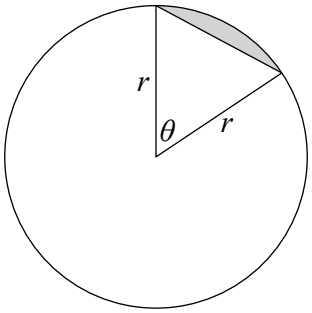


(D)



QUESTION 7

A circle with radius r and internal angle θ has a shaded segment as shown.



If θ is in radians, the area of the shaded segment is

(A) $\frac{r^2}{2}\left(\frac{\theta\pi}{180}-\sin(\theta)\right)$

(B) $\frac{r^2}{2}\left(\theta-\sin(\theta)\right)$

(C) $\frac{r^2}{4}\left(\frac{\theta\pi}{90}-1\right)$

(D) $\frac{r^2}{2}\left(\theta-1\right)$

QUESTION 8

In a survey, 80 respondents exercised daily, while 120 did not. When calculating the approximate 95% confidence interval for the proportion of people who exercise daily, the margin of error is

(A) $1.96\sqrt{\frac{0.4(1-0.4)}{200}}$

(B) $0.95\sqrt{\frac{0.4(1-0.4)}{200}}$

(C) $1.96\sqrt{\frac{0.67(1-0.67)}{120}}$

(D) $0.95\sqrt{\frac{0.67(1-0.67)}{120}}$

QUESTION 9

The approximate area under the curve $f(x) = \sqrt{2x+1}$ between $x = 0$ and $x = 4$ using the trapezoidal rule with four strips is

(A) $2 + \sqrt{3} + \sqrt{5} + \sqrt{7}$

(B) $2 + 2\left(\sqrt{3} + \sqrt{5} + \sqrt{7}\right)$

(C) $4 + 2\left(\sqrt{3} + \sqrt{5} + \sqrt{7}\right)$

(D) $4 + \sqrt{3} + \sqrt{5} + \sqrt{7}$

QUESTION 10

A survey plans to draw conclusions based on a random sample of 1% of Queensland's adult population.
To be regarded as a random sample, every

(A) adult in the population will be placed in an alphabetical list and every 100th person will be selected for the sample.

(B) adult in the population can choose to participate until the sample size has been reached.

(C) subgroup within the population will be represented in a similar proportion in the sample.

(D) adult in the population will have an equal chance of being selected for the sample.

© State of Queensland (QCAA) 2022
Licence: https://creativecommons.org/licenses/by/4.0 | Copyright notice: www.qcaa.qld.edu.au/copyright — lists the full terms and conditions, which specify certain exceptions to the licence. | Attribution: © State of Queensland (QCAA) 2022