

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

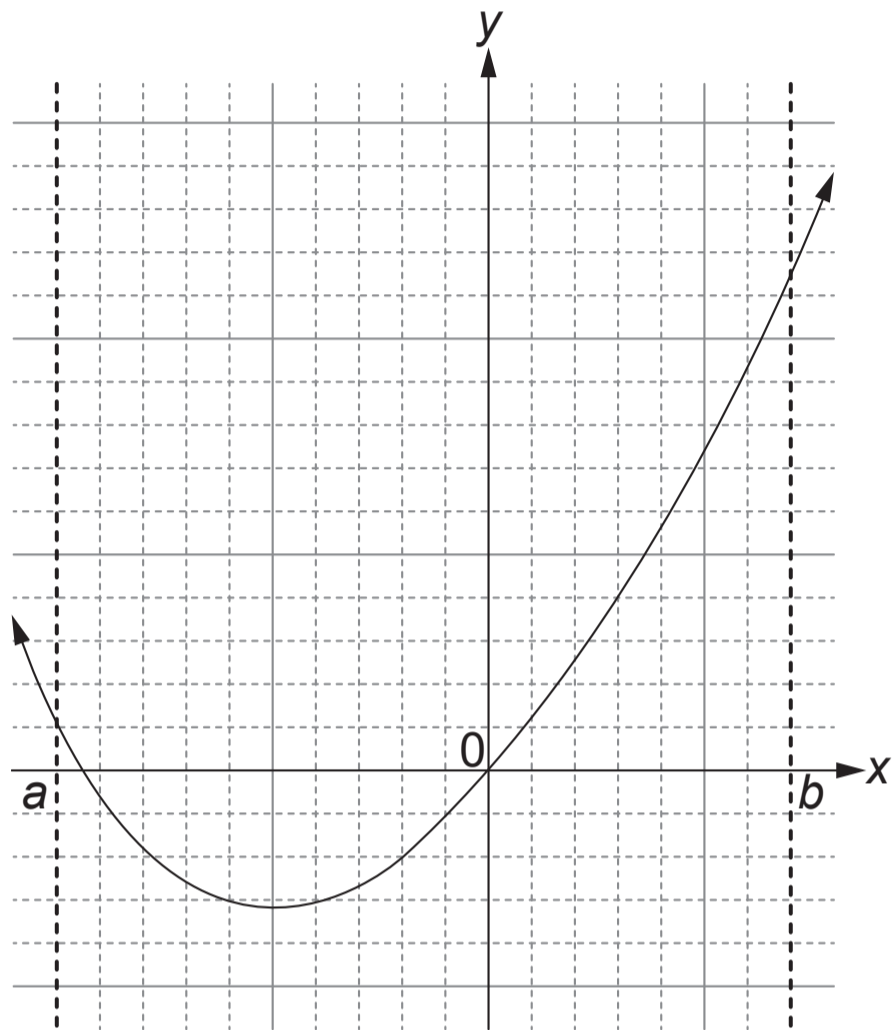
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Section 1

Question 1

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



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

- (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 units²
- (B) 18 units²
- (C) 36 units²
- (D) 54 units²

Question 4

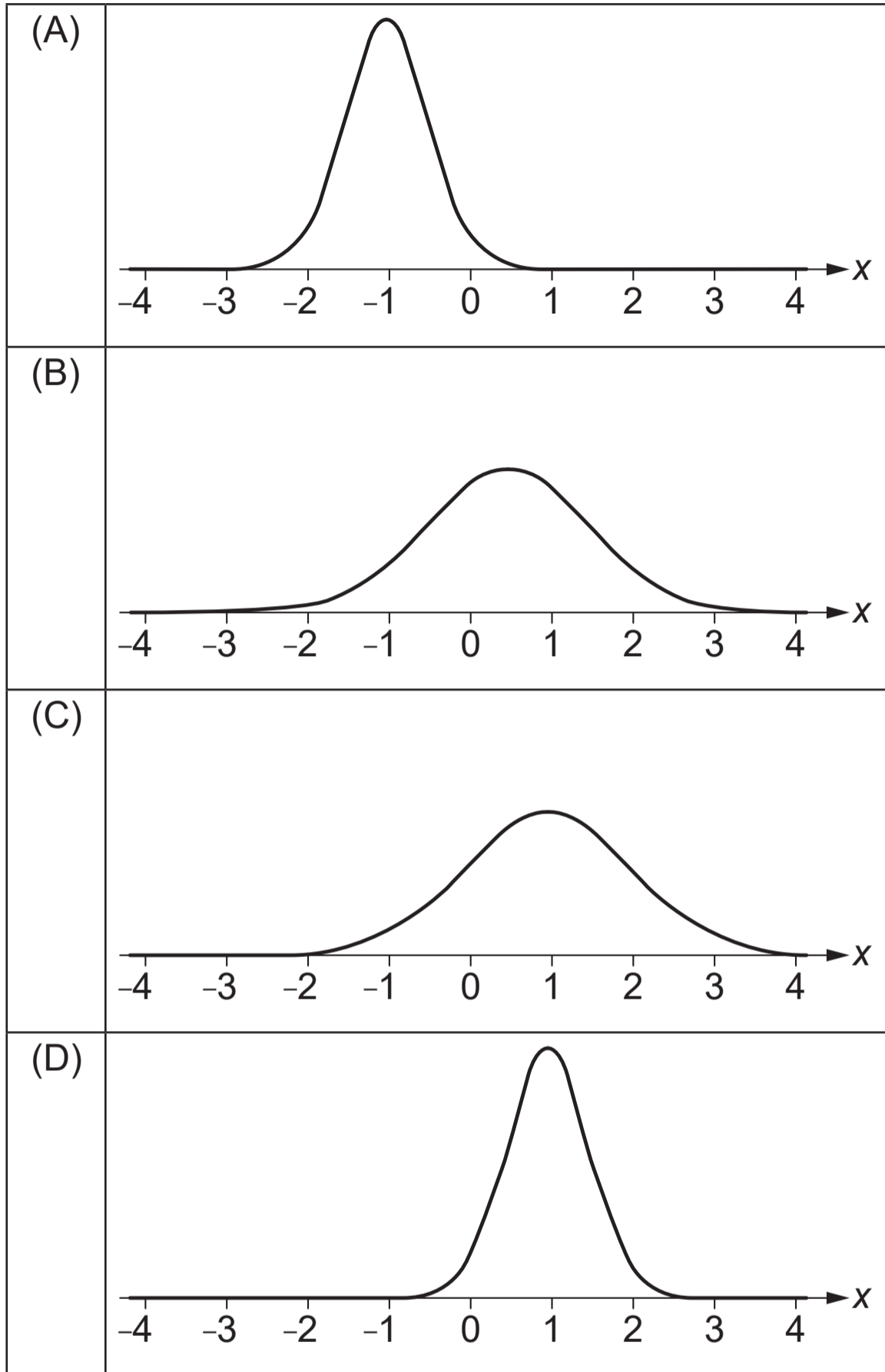
The weekly amount of money a company spends on repairs is normally distributed, with a mean of \$1200 and a standard deviation of \$100.

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

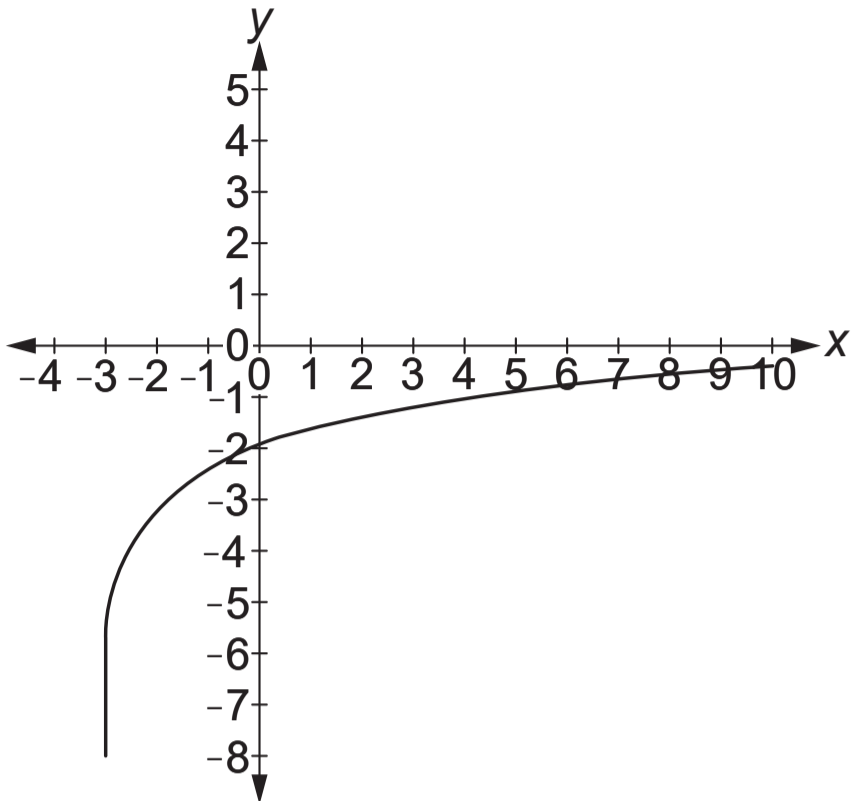
Which normal distribution curve best represents a normal distribution with a mean of 1 and a standard deviation of 0.5?



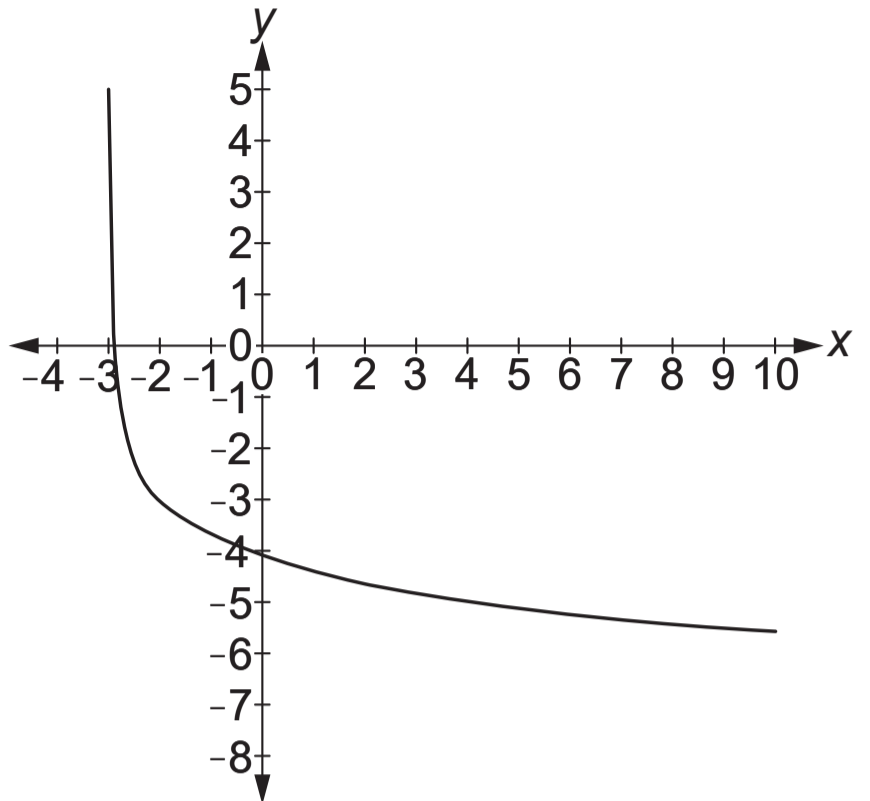
Question 6

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

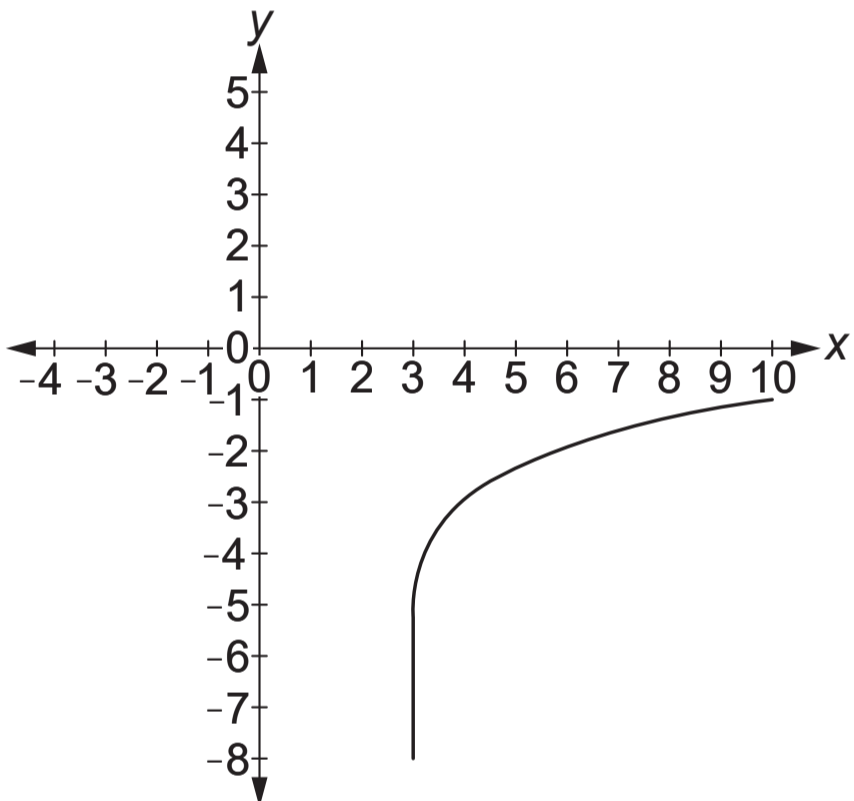
(A)



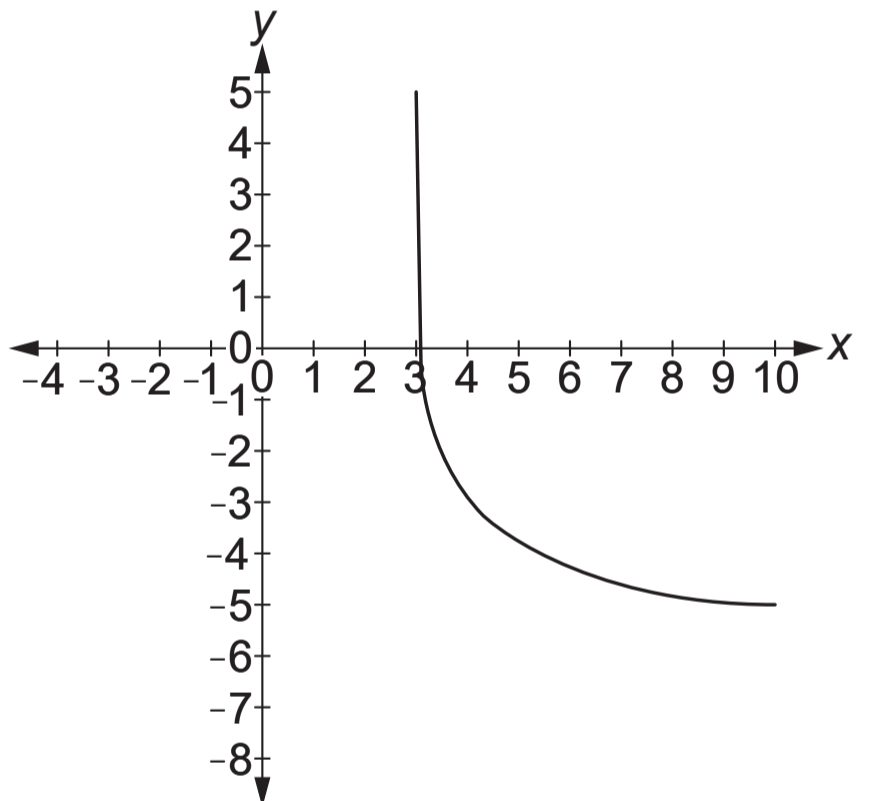
(B)



(C)

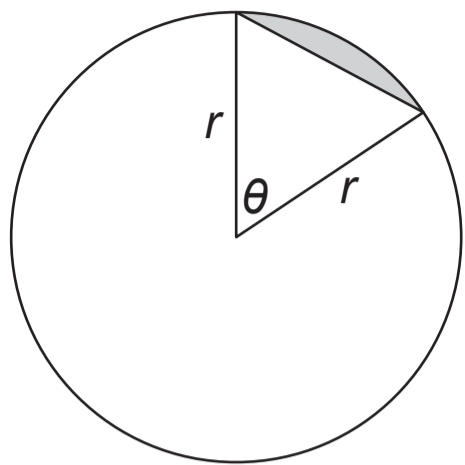


(D)



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

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

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

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) $2 + 2(\sqrt{3} + \sqrt{5} + \sqrt{7})$
- (C) $4 + 2(\sqrt{3} + \sqrt{5} + \sqrt{7})$
- (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.



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