

Inverse Functions

Practice Test (SAC) | Non-CAS

Question and Answer Book

Mathbanks Practice Assessment

- Reading time is **5 minutes**
- Writing time is **55 minutes**

Materials supplied

- Question and Answer Book of 15 pages
- Formula Sheet

Instructions

Students are **not** permitted to bring any technology (calculators or software), or notes of any kind, into the assessment room.

Students are **not** permitted to bring mobile phones and/or any unauthorised electronic devices into the assessment room.

Contents	pages
8 questions (36 marks)	2–15



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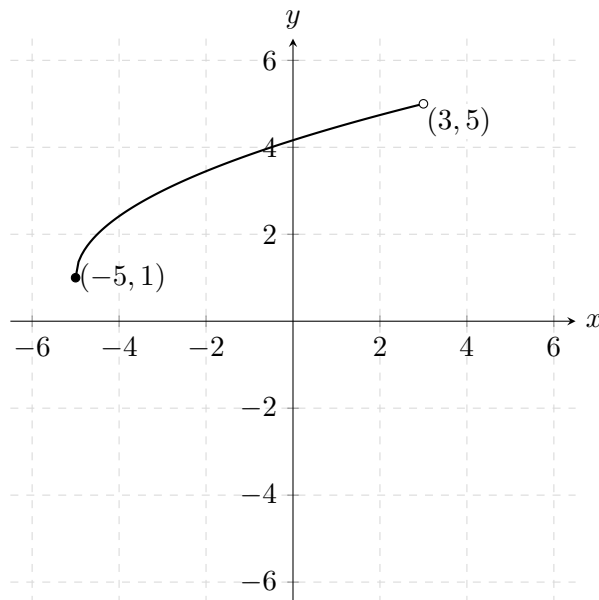
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Instructions

- Answer **all** questions in the spaces provided.
 - Write your responses in English.
 - In all questions where a numerical answer is required, an **exact** value must be given unless otherwise specified.
 - In questions where more than one mark is available, appropriate working **must** be shown.
 - Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.
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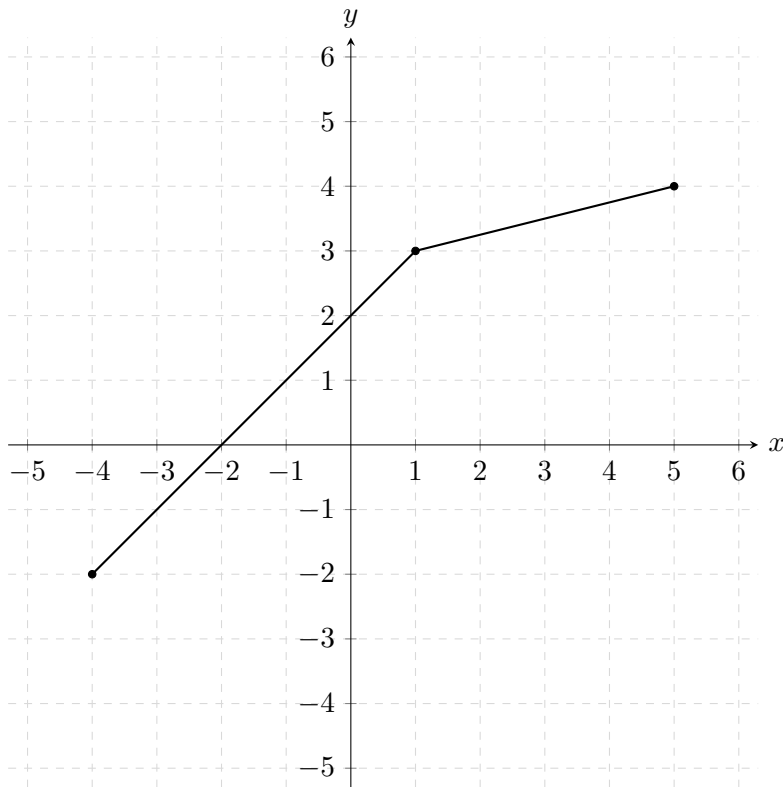
Question 1 (2 marks)

- a. The graph of a function with rule $y = f(x)$ is shown below. On the same set of axes, sketch the graph of $y = f^{-1}(x)$, the inverse function of f . 2 marks



Question 2 (6 marks)

The graph of $y = f(x)$, for $-4 \leq x \leq 5$, is shown below.



a. Write down the value of:

i. $f(1)$;

1 mark

ii. $f^{-1}(2)$.

1 mark

b. State the domain of f^{-1} .

2 marks

c. On the same set of axes above, sketch the graph of $y = f^{-1}(x)$.

2 marks

Question 3 (3 marks)

Let $f : [-1, 5) \rightarrow \mathbb{R}$, $f(x) = \frac{5 - 2x}{3}$.

a. Find the rule for the inverse function, $f^{-1}(x)$.

2 marks

b. State the range of f^{-1} .

1 mark

Question 4 (6 marks)

The function f is defined by $f(x) = \sqrt[3]{2x-1}$, for $-13 \leq x \leq 14$.

a. Write down the range of f .

2 marks

b. Find an expression for $f^{-1}(x)$.

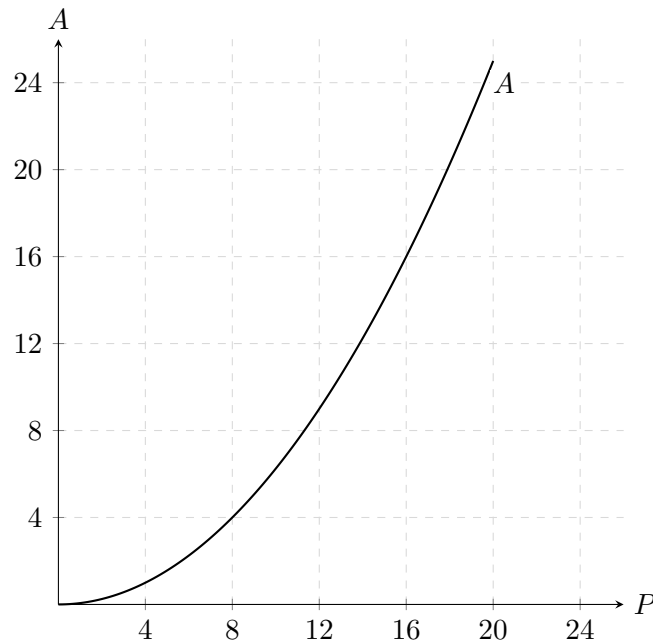
2 marks

c. Write down the domain and range of f^{-1} .

2 marks

Question 5 (5 marks)

The area, A , of a square can be represented by the function $A(P) = \frac{P^2}{16}$, $P \geq 0$, where P is the perimeter of the square. The graph of A , for $0 \leq P \leq 20$, is shown below.



- a. Find the value of $A(20)$.

1 mark

b. On the grid above, sketch the graph of the inverse function, A^{-1} .

3 marks

c. In the context of the question, explain the meaning of $A^{-1}(4) = 8$.

1 mark

Question 6 (6 marks)

Let $f(x) = \sqrt{x-3}$, for $x \geq 3$.

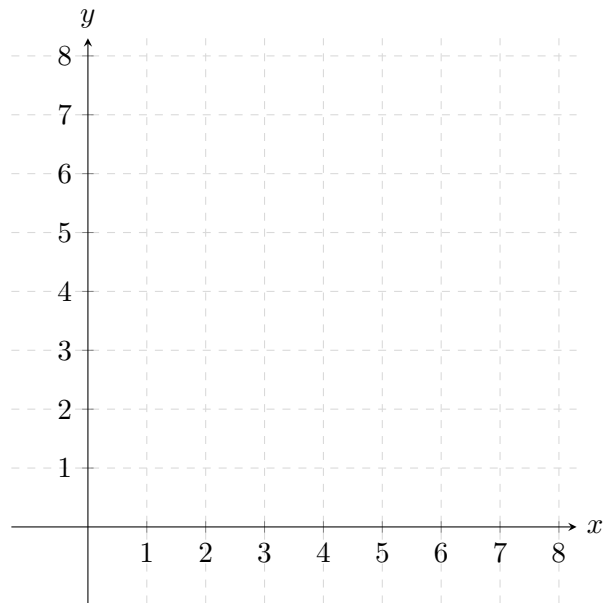
a. Find $f^{-1}(x)$.

2 marks

b. State the domain and range of f^{-1} .

2 marks

- c. On the set of axes below, sketch $y = f(x)$, $y = f^{-1}(x)$ and the line $y = x$, labelling the endpoint of each curve. 2 marks



Question 7 (3 marks)

It is given that $f : (-4, a] \rightarrow \mathbb{R}$, $f(x) = (x - 1)^2 + 2$.

a. Find the maximum value of a such that f has an inverse function.

1 mark

b. Hence, state the domain and range of $f(x)$.

2 marks

The function f is defined as $f(x) = \sqrt{\frac{6+2x}{6-2x}}$, for $-3 \leq x < 3$.

[illegible]

Mathematical Methods Units 1 & 2 formulas

Functions and graphs

distance formula	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
midpoint formula	midpoint = $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$

Straight line graphs

general equation	$y = mx + c$
equation through point (x_1, y_1)	$y - y_1 = m(x - x_1)$
gradient	$m = \frac{y_2 - y_1}{x_2 - x_1}$

Mensuration

circumference of a circle	$2\pi r$	area of a circle	πr^2
volume of a sphere	$\frac{4}{3}\pi r^3$	volume of a cylinder	$\pi r^2 h$

Calculus

$\frac{d}{dx}(x^n) = nx^{n-1}$	$\int x^n dx = \frac{1}{n+1}x^{n+1} + c, n \neq -1$
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Probability

$\Pr(A) = 1 - \Pr(A')$	$\Pr(A \cup B) = \Pr(A) + \Pr(B) - \Pr(A \cap B)$
$\Pr(A B) = \frac{\Pr(A \cap B)}{\Pr(B)}$	

About Mathbanks

Mathbanks is an online question bank for VCE Mathematics. It contains thousands of original, exam-style questions — each written with a complete worked solution and mark scheme — organised by topic and by difficulty across Mathematical Methods Units 1 & 2 and Units 3 & 4.

About This Test

This practice test features inverse functions and inverse relations, restricting the domain, and the graphs of a function and its inverse, with a focus on non-CAS algebraic techniques commonly assessed in VCE Mathematical Methods Units 1 & 2. Students practise finding the rule for an inverse function by interchanging x and y , stating the domain and range of an inverse, and determining the conditions under which an inverse function exists, including restricting the domain of a many-to-one function. The test develops fluency with the relationship between a function and its inverse as reflections in the line $y = x$, evaluating and composing a function with its inverse, and working with square-root, cubic and other one-to-one functions. Graphing topics include sketching the graph of $y = f^{-1}(x)$ from the graph of $y = f(x)$, identifying intercepts and endpoints, and reading domain and range from a graph. Students also apply inverse functions to model and solve problems set in context.



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