

Trial Examination 2012

## VCE Mathematical Methods (CAS) Units 3 & 4

Written Examination 1

### Question and Answer Booklet

Reading time: 15 minutes

Writing time: 1 hour

Student's Name: \_\_\_\_\_

Teacher's Name: \_\_\_\_\_

#### Structure of Booklet

Number of questions	Number of questions to be answered	Number of marks
10	10	40

Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers.

Students are NOT permitted to bring into the examination room: notes of any kind, blank sheets of paper, white out liquid/tape or a calculator of any type.

#### Materials supplied

Question and answer booklet of 10 pages, with detachable sheet of miscellaneous formulas in the centerfold.

Working space is provided throughout the booklet.

#### Instructions

Detach the formula sheet from the centre of this book during reading time.

Write your **name** and **teacher's name** in the space provided above on this page.

All written responses must be in English.

**Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room.**

Students are advised that this is a trial examination only and cannot in any way guarantee the content or the format of the 2012 VCE Mathematical Methods (CAS) Units 3 & 4 Written Examination 1.

**Instructions**

Answer **all** questions in the spaces provided.

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 booklet are **not** drawn to scale.

**Question 1**

If  $h(x) = x \sin^2(x)$ , find  $h'\left(\frac{\pi}{6}\right)$ .

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3 marks

**Question 2**

Find the value of  $k$  given that  $\int_{\sqrt{2}}^2 \frac{1}{3-x} dx = \log_e(k)$ .

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2 marks

**Question 3**Functions  $f$  and  $g$  are given by

$$f: R \rightarrow R \text{ where } f(x) = x^2$$

and

$$g: R \setminus \{-2\} \rightarrow R \text{ where } g(x) = \frac{1}{x+2}.$$

- a. Solve the equation  $f(g(x)) = 4$ .

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2 marks

- b. The inverse of  $g$  is  $g^{-1}$ .

Find  $g^{-1}(x)$ , stating its domain and range.

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3 marks

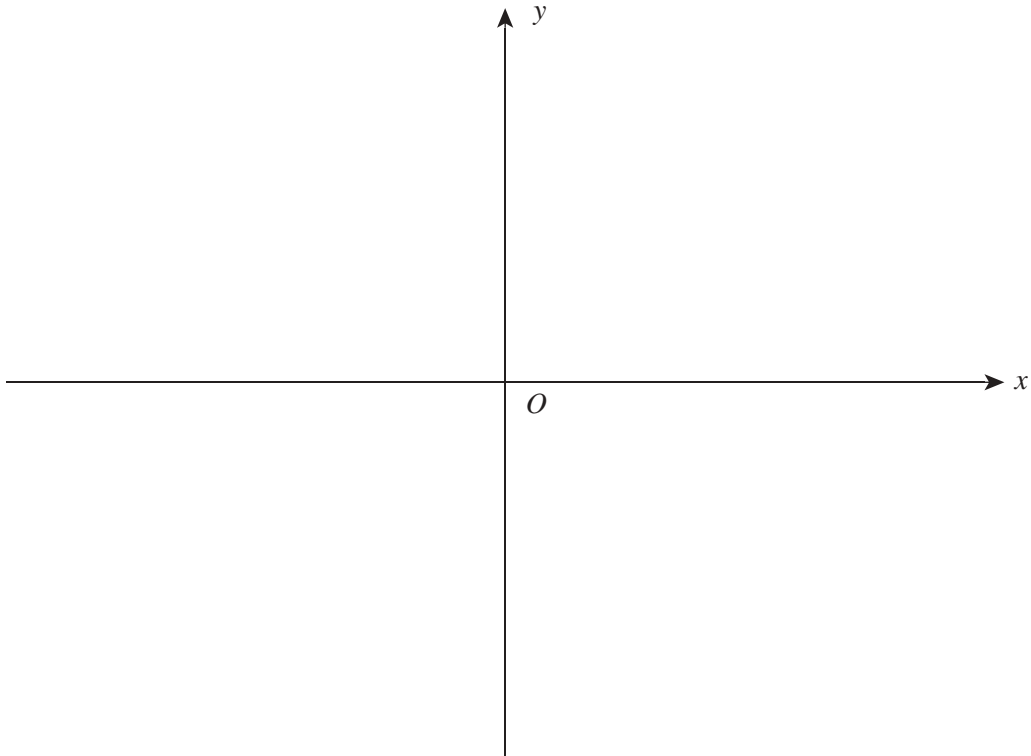
Total 5 marks



**Question 5**

- a. Sketch the curve with equation  $y = \frac{2x-1}{x+1}$ .

State the coordinates of the points where the curve intersects the coordinate axes, and the equations of any asymptotes.



4 marks

- b. Hence, or otherwise, solve the inequality  $0 < \frac{2x-1}{x+1} < 2$ .

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1 mark  
Total 5 marks

**Question 6**

A continuous random variable  $X$  has probability density function

$$f(x) = \begin{cases} ax + b & \text{if } 0 \leq x \leq 1 \\ 0 & \text{elsewhere} \end{cases}$$

The mean of  $X$  is  $\frac{7}{12}$ .

Find the values of  $a$  and  $b$ .

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4 marks

**Question 7**

If two events,  $A$  and  $B$ , are such that  $\Pr(A) = \frac{2}{5}$ ,  $\Pr(B) = \frac{1}{5}$  and  $\Pr(A|B) = \frac{3}{5}$ , find  $\Pr(B|A)$ .

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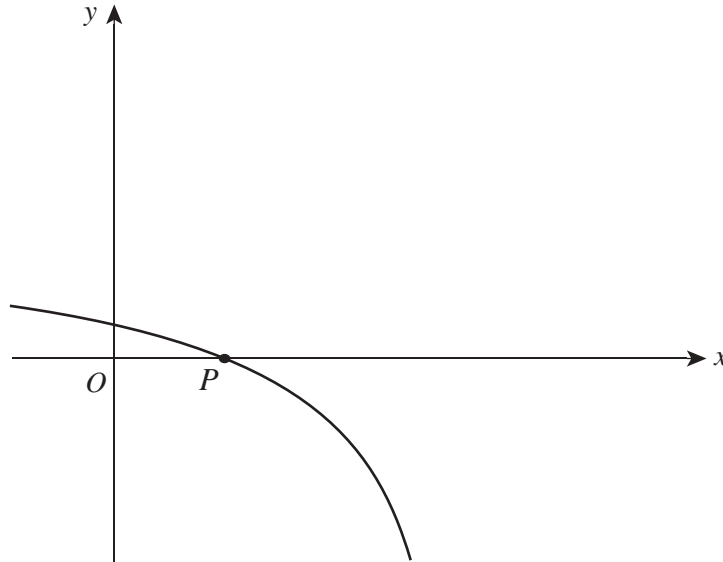
3 marks



**Question 9**

Part of the graph of  $y = 4 - e^{2x}$  is shown below.

The curve crosses the  $x$ -axis at  $P$ . The coordinates of  $P$  are  $(\log_e(2), 0)$ .



**a.** Show that the equation of the normal to the curve  $y = 4 - e^{2x}$  at the point  $P$  is given

by  $y = \frac{1}{8}x - \frac{1}{8}\log_e(2)$ .

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2 marks





