SUPERVISOR TO ATTACH PROCESSING LABEL HERE

STUDENT NUMBER

									Letter
Figures									
Words									

Victorian Certificate of Education 1997

MATHEMATICAL METHODS

Common Assessment Task 2: Written examination (Facts, skills and applications task)

Thursday 6 November 1997: 9.00 am to 10.45 am
Reading time: 9.00 am to 9.15 am
Writing time: 9.15 am to 10.45 am
Total writing time: 1 hour 30 minutes

PART II

QUESTION AND ANSWER BOOK

Directions to students

This task has two parts: Part I (multiple-choice questions) and Part II (short-answer questions).
Part I consists of a separate question book and must be answered on the answer sheet provided for multiple-choice questions.
Part II consists of a separate question and answer book.
You must complete **both** parts in the time allotted. When you have completed one part continue immediately to the other part.
A detachable formula sheet for use in both parts is in the centrefold of the Part I question book.

At the end of the task
Place the answer sheet for multiple-choice questions (Part I) inside the front cover of this question and answer book (Part II) and hand them in.

Structure of book

Number of questions	*Number of questions to be answered*	*Number of marks*
6	6	17

Directions to students

Materials
Question and answer book of 9 pages, including one blank page for rough working.
You may bring to the CAT up to four pages (two A4 sheets) of pre-written notes.
You may use an approved scientific and/or graphics calculator, ruler, protractor, set-square and aids for curve-sketching.

The task
Detach the formula sheet from the centre of the Part I book during reading time.
Ensure that you write your **student number** in the space provided on the cover of this book.
The marks allotted to each question are indicated at the end of the question.
There is a total of 17 marks available for Part II.
You need not give numerical answers as decimals unless instructed to do so. Alternative forms may involve, for example, π, e, surds or fractions. A decimal approximation will not be accepted if an exact answer is required to a question.
Calculus must be used to evaluate derivatives and definite integrals. A decimal value, no matter how accurate, will not be rewarded unless the appropriate working is shown.
Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.
All written responses should be in English.

At the end of the task
Place the answer sheet for multiple-choice questions (Part I) inside the front cover of this question and answer book (Part II) and hand them in.

Specific instructions to students

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

Question 1

Find the value of x for which $3e^{2x} = 1997$, giving your answer correct to two decimal places.

2 marks

Question 2

The temperature on a particular day can be modelled by the function

$$C = -4 \cos\left(\frac{\pi t}{12}\right) + 16$$

where t is the time elasped, in hours, after 4:00 am and C is the temperature in degrees Celsius.

a. Calculate the temperature at 8:00 am.

1 mark

b. At what time is the temperature first 20°C?

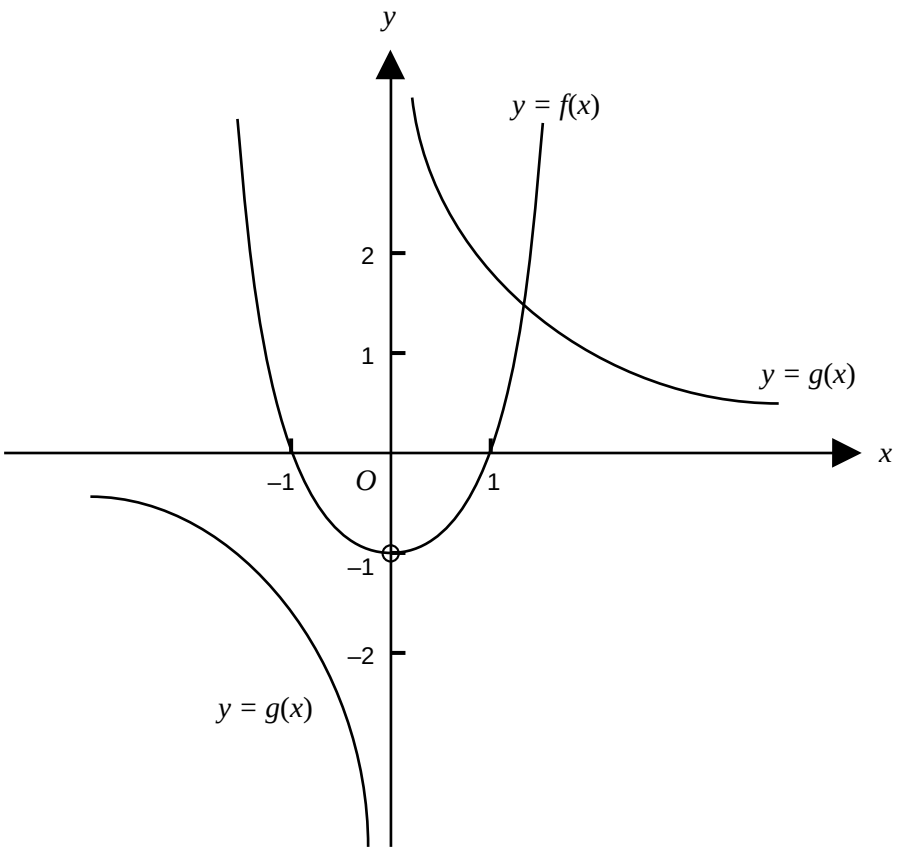
2 marks

Total 3 marks

TURN OVER

Question 3

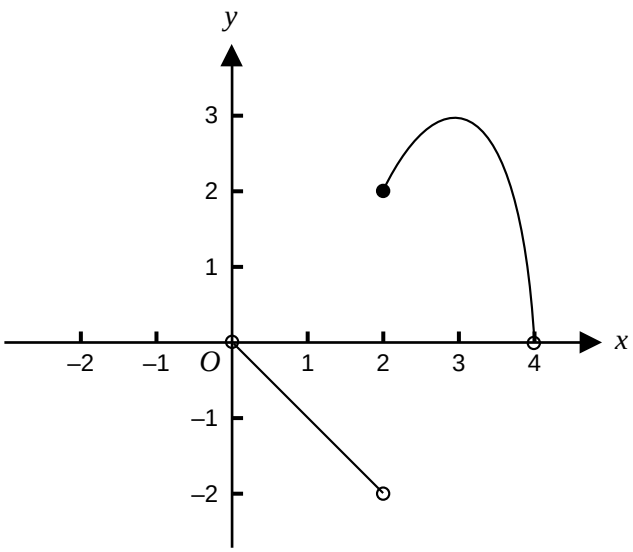
The graphs whose equations are $y = f(x)$ and $y = g(x)$ are shown in the diagram below. On the same set of axes, sketch the graph whose equation is $y = f(x) + g(x)$.



3 marks

Question 4

The graph of the function f is shown below.

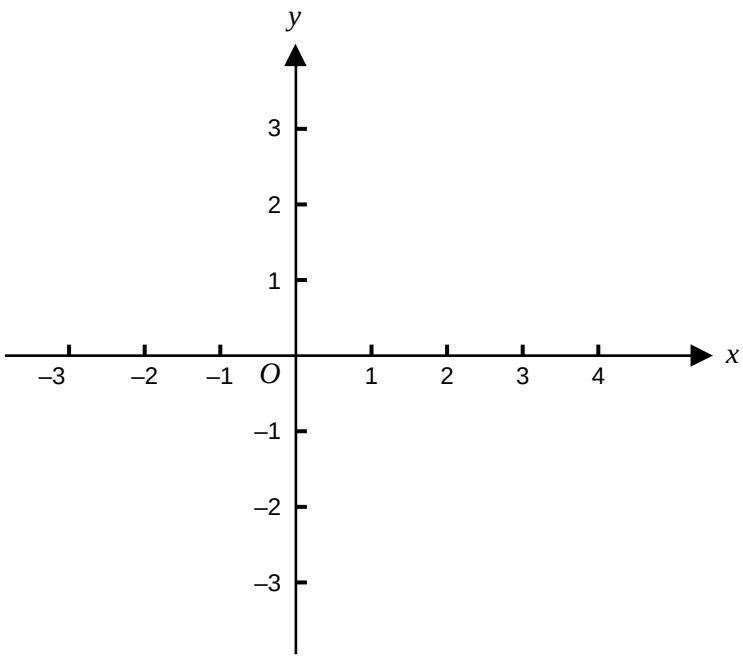


a. State the implied domain of f.

_____

1 mark

b. Sketch the graph of the derived function f' on the set of axes below.



1 mark

c. State the domain of f'.

_____

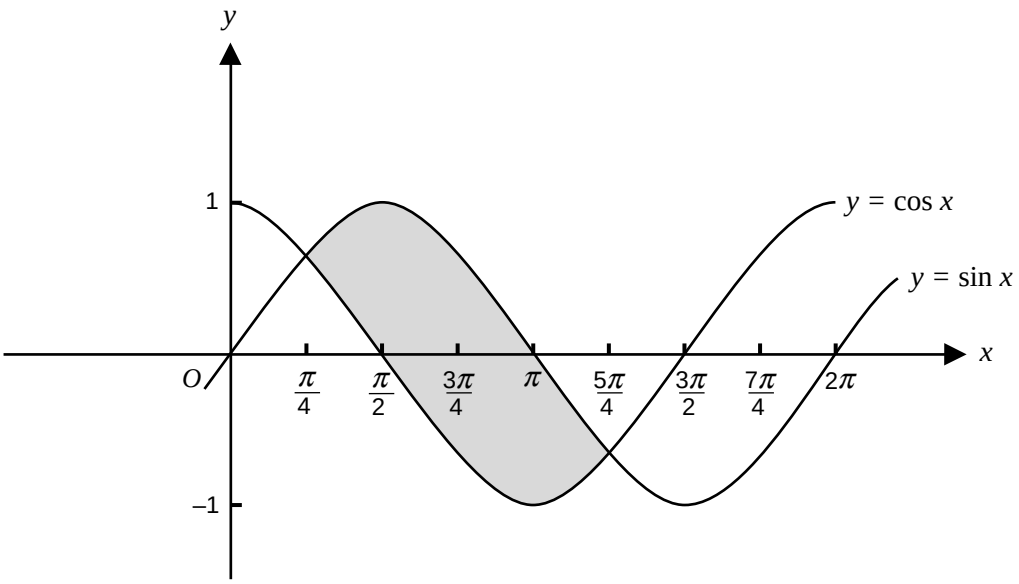
1 mark

Total 3 marks

TURN OVER

Question 5

Find the exact area of the shaded region in the diagram below.



3 marks

Question 6

Rodney rides a bicycle to work. Over a three-year period, he records the time it took him to ride to work on 1000 occasions. His results are given in the table below.

time (t minutes)	number of occasions
$t \leq 20$	0
$20 < t \leq 21$	3
$21 < t \leq 22$	12
$22 < t \leq 23$	122
$23 < t \leq 24$	347
$24 < t \leq 25$	355
$25 < t \leq 26$	141
$26 < t \leq 27$	18
$27 < t \leq 28$	2
$t > 28$	0

If Rodney's trip takes longer than 25 minutes he is in danger of being late for work.

a. Calculate the proportion of occasions when he takes longer than 25 minutes.

1 mark

b. Calculate, correct to four decimal places, the standard error of this proportion.

1 mark

c. Find the approximate 95% confidence interval for the proportion, p, of occasions when Rodney takes longer than 25 minutes to ride to work. State your answer correct to four decimal places.

1 mark

Total 3 marks

Working space

END OF PART II QUESTION AND ANSWER BOOK