VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

Victorian Certificate of Education
2003

MATHEMATICAL METHODS (CAS)

PILOT STUDY

Written examination 1

(Facts, skills and applications)

Friday 7 November 2003

Reading time: 9.00 am to 9.15 am (15 minutes)
Writing time: 9.15 am to 10.45 am (1 hour 30 minutes)

PART I
MULTIPLE-CHOICE QUESTION BOOK

This examination has two parts: Part I (multiple-choice questions) and Part II (short-answer questions). Part I consists of this 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.

Structure of book

Number of questions	*Number of questions to be answered*	*Number of marks*
27	27	27

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers, a protractor, set-squares, aids for curve sketching, up to four pages (two A4 sheets) of pre-written notes (typed or handwritten) and one approved CAS calculator (memory may be retained) and/or one scientific calculator. For the TI-92, Voyage 200 or approved computer based CAS, their full functionality and/or one scientific calculator may be used, but other programs or files are not permitted.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or white out liquid/tape.

Materials supplied
- Question book of 14 pages, with a detachable sheet of miscellaneous formulas in the centrefold.
- Answer sheet for multiple-choice questions.

Instructions
- Detach the formula sheet from the centre of this book during reading time.
- Check that your **name** and **student number** as printed on your answer sheet for multiple-choice questions are correct, **and** sign your name in the space provided to verify this.
- Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

At the end of the examination
- Place the answer sheet for multiple-choice questions (Part I) inside the front cover of the question and answer book (Part II).
- You may retain this question book.

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

Working space

Instructions for Part I

Answer **all** questions in pencil on the answer sheet provided for multiple-choice questions.

Choose the response that is **correct** for the question.

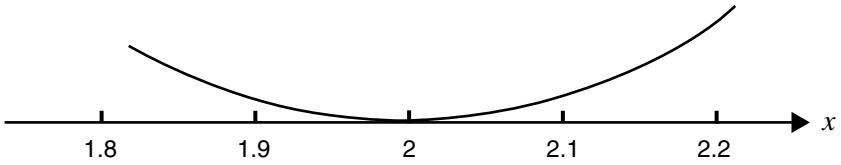
A correct answer scores 1, an incorrect answer scores 0.

Marks will **not** be deducted for incorrect answers.

No marks will be given if more than one answer is completed for any question.

Question 1

A polynomial function p has degree three. A portion of its graph near the point on the graph with coordinates $(2, 0)$ is shown below.



Which one of the following could be the rule for the third degree polynomial p?

A. $p(x) = x(x + 2)^2$

B. $p(x) = (x - 2)^3$

C. $p(x) = x^2(x - 2)$

D. $p(x) = (x - 1)(x - 2)^2$

E. $p(x) = -x(x - 2)^2$

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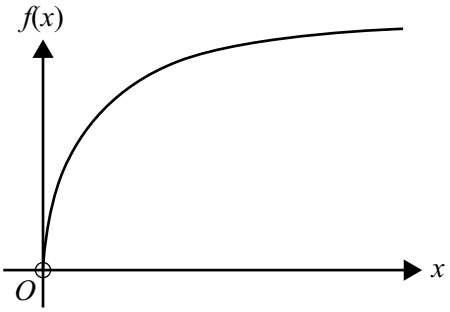
Question 2

The graph of the function $f: R^+ \to R$ with rule $f(x) = x^{\frac{1}{3}}$ is most likely to be

A.



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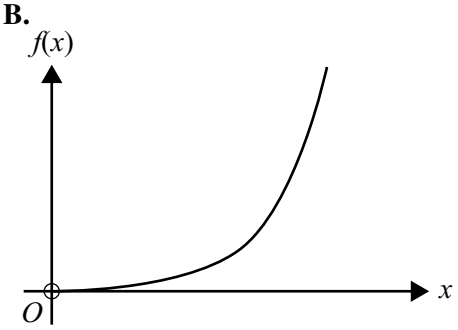

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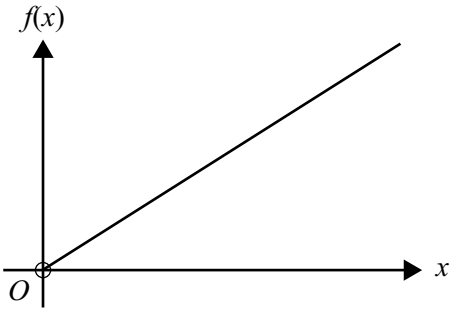

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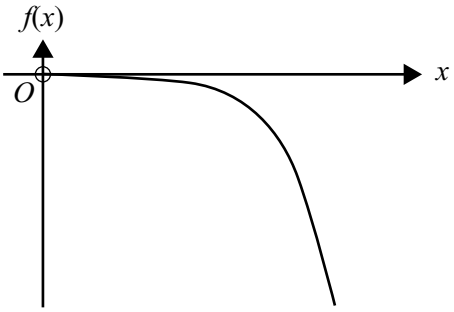
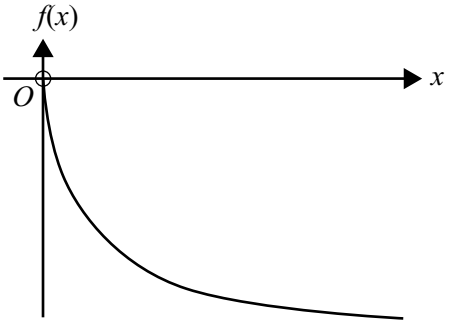


E.



Question 3

Dylan drew the graph of the function $f: R \to R, f(x) = \frac{x^3 + 1}{x}$ by adding the ordinates of the graphs of two functions g and h.

The rules for g and h that Dylan could have used are

A. $g(x) = x^3$ and $h(x) = \frac{1}{x}$

B. $g(x) = x^2$ and $h(x) = \frac{1}{x}$

C. $g(x) = x^3 + 1$ and $h(x) = x$

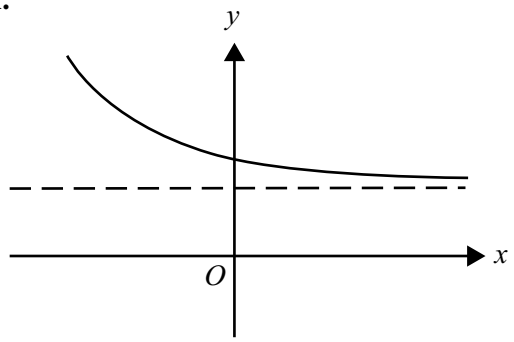
D. $g(x) = x^3 + 1$ and $h(x) = \frac{1}{x}$

E. $g(x) = x^2$ and $h(x) = 1$

Question 4

If k and P are positive real numbers, which one of the following graphs is most likely to be the graph of the function with equation $y = e^{kx} + P$?

A.



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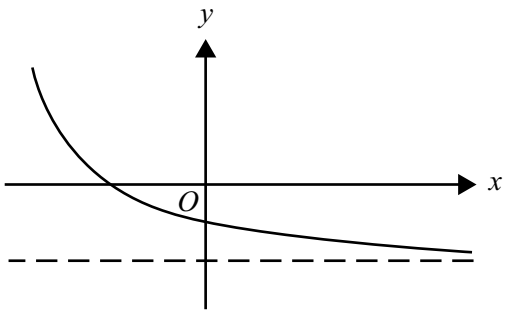

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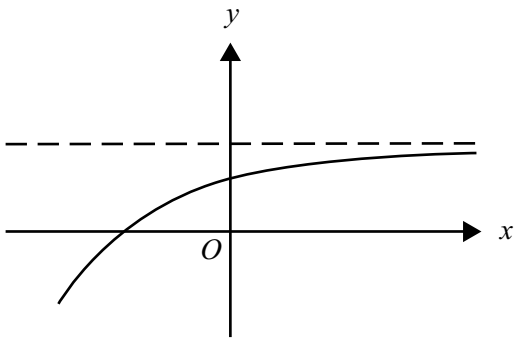

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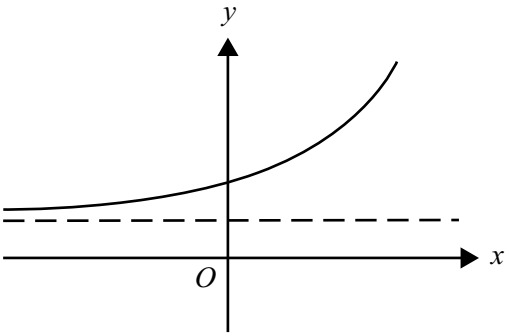
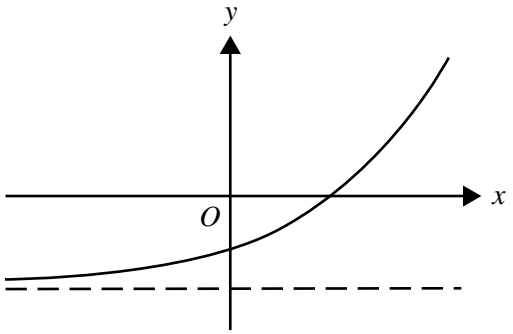


E.



Question 5

The graph of the function f is obtained from the graph with equation $y = \sqrt{x}$ by a reflection in the y-axis followed by a dilation of 2 units from the x-axis.

The rule for f is

A. $f(x) = -2\sqrt{x}$

B. $f(x) = \sqrt{-2x}$

C. $f(x) = \sqrt{-0.5x}$

D. $f(x) = -0.5\sqrt{x}$

E. $f(x) = 2\sqrt{-x}$

Question 6

The number of solutions of the equation $0.5\cos(2x) = 1$, for $x \in [-\pi, \pi]$ is

A. 0

B. 1

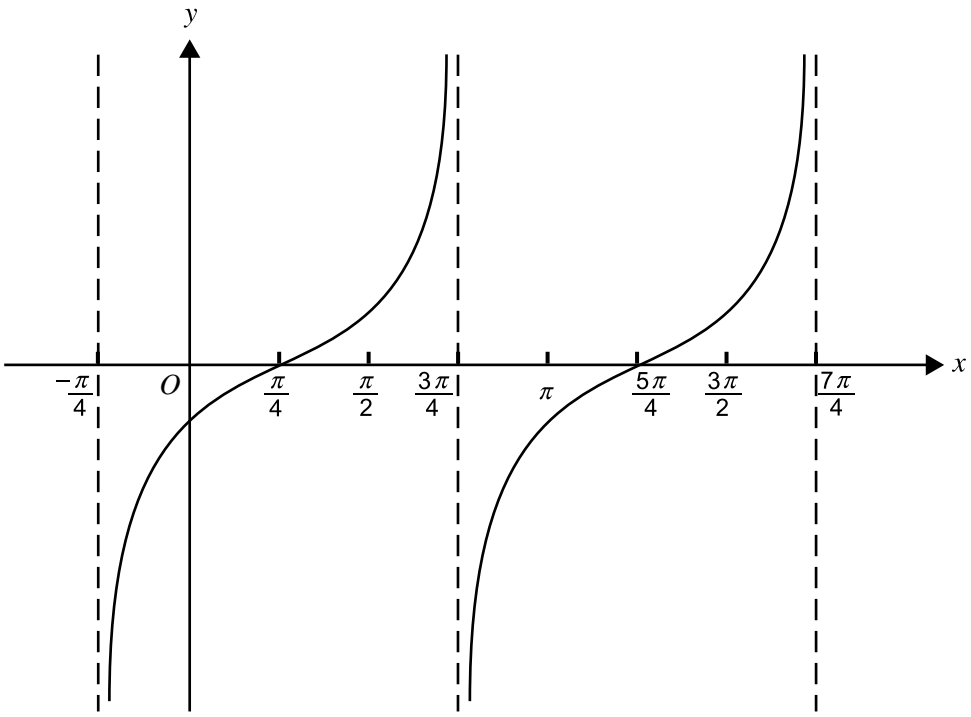
C. 2

D. 3

E. 4

Question 7

The diagram shows two cycles of the graph of a circular function.



The period of the circular function is

A. $\frac{\pi}{2}$

B. $\frac{3\pi}{4}$

C. π

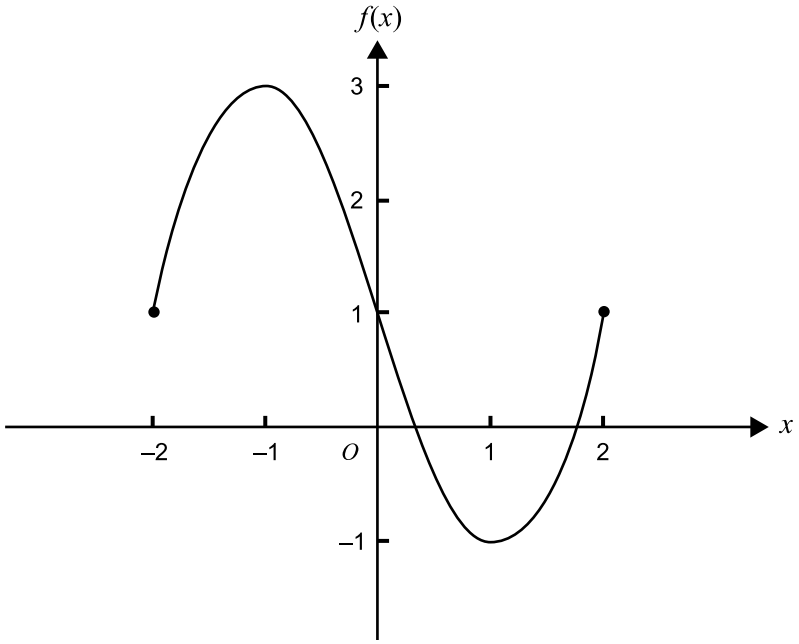
D. $\frac{7\pi}{4}$

E. 2π

Question 8

The graph of the function $f:[-2, 2] \to R, f(x) = P\sin(k\pi x) + Q$ is shown below.

The values of P, k, and Q respectively are



	P	k	Q
A.	2	0.5	1
B.	2	2	1
C.	–2	2	–1
D.	–2	0.5	1
E.	–2	0.5	–1

Question 9

If $y = \cos^2(2x)$, then $\frac{dy}{dx}$ is equal to

A. $4\sin(2x)\cos(2x)$

B. $-4\sin(2x)\cos(2x)$

C. $4x\sin(2x^2)$

D. $-4x\sin(2x^2)$

E. $-4\sin(x)\cos(2x)$

Question 10

If $y = x\log_e(x)$, then the rate of change of y with respect to x when $x = 2$ is equal to

A. $\log_e(2)$

B. 1

C. $1 + \log_e(2)$

D. 2

E. $1 + \log_2(e)$

Question 11

Let $f:R \to R$ be a function such that $f'(-1) = 0$

and $f'(x) > 0$ when $x < -1$

and $f'(x) > 0$ when $x > -1$.

At $x = -1$, the graph of f has a

A. local minimum.

B. local maximum.

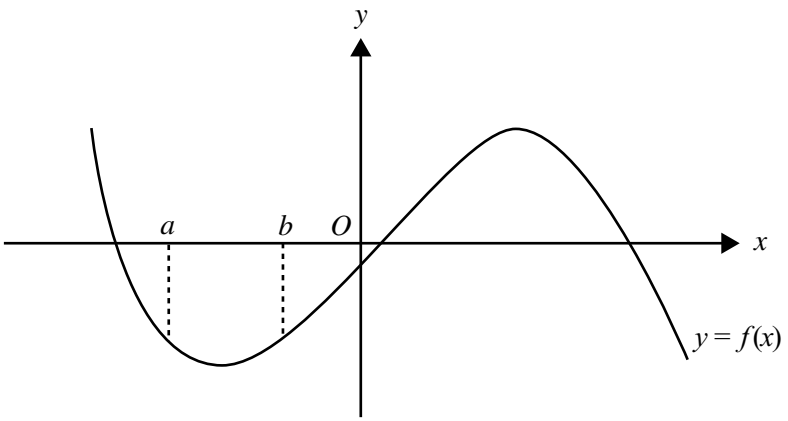
C. stationary point of inflection.

D. point of discontinuity.

E. gradient of –1.

Question 12

Part of the graph of the function f is shown below.



Let g be a function such that $g'(x) = f(x)$.

On the interval (a, b), the graph of g will have

A. negative gradient.

B. positive gradient.

C. a local minimum value.

D. a local maximum value.

E. zero gradient.

Question 13

If $f'(x) = 4e^{2x}$, then $f(x)$ could be equal to

A. $2e^{2x} + 3$

B. $4e^{2x} + 5$

C. $8e^{2x} + 2$

D. $4\log_e(2x) - 4$

E. $\log_e(8x) + 5$

Question 14

If $\int_1^4 f(x)dx = 2$, then $\int_1^4 \big(2f(x)+3\big)dx$ is equal to

A. 2

B. 4

C. 7

D. 10

E. 13

Question 15

Let g be a continuous function on the interval [0, 5], and f a function such that $f'(x) = g(x)$ for all $x \in [0, 5]$.

Then $\int_0^5 g(x)dx$ is equal to

A. $g'(5) - g'(0)$

B. $f(5)$

C. $f'(5) - f'(0)$

D. $g(5) - g(0)$

E. $f(5) - f(0)$

Question 16

The total area of the regions enclosed by the graph of $y = \sin(2x)$ and the x-axis, between $x = 0$ and $x = 2\pi$, is equal to

A. 1

B. 2

C. 4

D. 8

E. 16

Question 17

The interval [0, 4] is divided into n equal subintervals by the points $x_0, x_1, \ldots x_{n-1}, x_n$ where $0 = x_0 < x_1 < \ldots < x_{n-1} < x_n = 4$. Let $\delta x = x_i - x_{i-1}$ for $i = 1, 2, \ldots, n$.

Then $\lim_{\delta x \to 0} \sum_{i=1}^{n} \big(x_i\, \delta x\big)$ is equal to

A. $\int_4^0 x \; dx$

B. $\int_0^4 \frac{x^2}{2} dx$

C. 0

D. 4

E. 8

Question 18

Let $f(x) = e^x$.

For all positive real numbers x and y, $f(x + y)$ is equal to

A. $f(x) + f(y)$

B. $f(x)\,f(y)$

C. $f(xy)$

D. $(f(x))^y$

E. $f(x^y)$

Question 19

The line with equation $y = x + k$, where k is a real number, intersects the parabola with equation $y = x^2 + x - 2$ in two distinct points if

A. $k < -2$

B. $k > -2$

C. $k = -2$

D. $k < 2$

E. $k \neq 2$

Question 20

Let $p(x) = (x^2 + a)(x + b)(x - c)$ where a, b and c are three distinct positive real numbers.

The number of real solutions to the equation $p(x) = 0$ is exactly

A. 0

B. 1

C. 2

D. 3

E. 4

Question 21

Let $f(x) = \dfrac{2}{x-3} + 1$.

The equations of the asymptotes of the graph of the inverse function f^{-1} are

A. $x = 1$ and $y = 3$

B. $x = 1$ and $y = -3$

C. $x = 3$ and $y = 1$

D. $x = -3$ and $y = -1$

E. $x = -1$ and $y = -3$

Question 22

If $2\log_e(x) - \log_e(x + 2) = 1 + \log_e(y)$, then y is equal to

A. $\frac{x^2}{10(x+2)}$

B. $\frac{2x}{x+2} - 1$

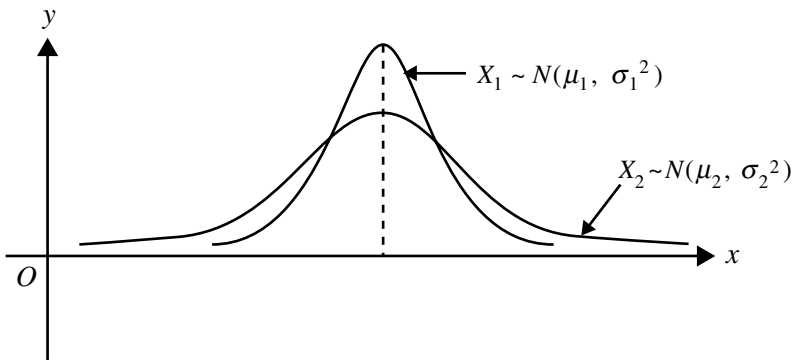
C. $\frac{x^2}{x+2}$

D. $\frac{2x}{x+2}$

E. $\frac{x^2}{e(x+2)}$

Question 23

The diagram below shows the graphs of two normal distribution curves with means μ_1 and μ_2 and standard deviations σ_1 and σ_2 respectively.



Which one of the following statements is true?

A. $\mu_1 > \mu_2$ and $\sigma_1 = \sigma_2$

B. $\mu_1 > \mu_2$ and $\sigma_1 > \sigma_2$

C. $\mu_1 = \mu_2$ and $\sigma_1 > \sigma_2$

D. $\mu_1 = \mu_2$ and $\sigma_1 < \sigma_2$

E. $\mu_1 < \mu_2$ and $\sigma_1 = \sigma_2$

Question 24

Which of the following tables could represent the probability distribution of a discrete random variable?

I

v	2	3	4	5
$\Pr(V = v)$	0.1	0.2	0.4	0.5

II

w	–2	–1	0	1
$\Pr(W = w)$	0.2	0.3	0.3	0.2

III

x	10	20	30	40
$\Pr(X = x)$	0.4	0.3	0.2	0.1

IV

y	0	1	2	3
$\Pr(Y = y)$	–0.1	0.4	0.5	0.2

V

z	1	2	3	4
$\Pr(Z = z)$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$

A. I and III
B. I and IV
C. II and IV
D. II, III and V
E. I, II and V

Question 25

The lifetime, in hours, of a light globe, can be modelled by a continuous random variable with probability density function

$$g(t) = \begin{cases} 0.001e^{-0.001t} & \text{if} \quad t > 0 \\ 0 & \text{if} \quad t \leq 0 \end{cases}$$

The probability, correct to three decimal places, that a randomly selected light globe has a lifetime less than 1000 hours is

A. 0.095
B. 0.368
C. 0.500
D. 0.632
E. 0.905

Question 26

60 per cent of all tickets sold at a racecourse are Adult tickets and the remaining 40 per cent are Concession tickets. A random sample of 20 tickets is taken.

The probability that this sample contains exactly twelve Adult tickets is equal to

A. $\frac{{}^{60}C_{12} \times {}^{40}C_{8}}{{}^{100}C_{20}}$

B. ${}^{20}C_{12}\,(0.4)^{8} \times (0.6)^{12}$

C. ${}^{20}C_{12}\,(0.4)^{12} \times (0.6)^{8}$

D. $(0.4)^{8} \times (0.6)^{12}$

E. $(0.4)^{12} \times (0.6)^{8}$

Question 27

A bag contains 12 bread rolls, of which 8 are white and the remainder multigrain. Tony takes 2 bread rolls at random from the bag to eat.

The probability that at least one is a multigrain roll is

A. $1-\frac{2^{12}}{3^{12}}$

B. $1-\frac{{}^{8}C_{2}}{{}^{12}C_{2}}$

C. $1-\frac{2^{12}}{3^{12}}-12\times\frac{1}{3}\times\frac{2^{11}}{3^{11}}$

D. $1-\frac{{}^{8}C_{2}}{{}^{12}C_{2}}-\frac{{}^{8}C_{1}\times {}^{4}C_{1}}{{}^{12}C_{2}}$

E. $\frac{{}^{8}C_{1}\times {}^{4}C_{1}}{{}^{12}C_{2}}$

END OF PART I MULTIPLE-CHOICE QUESTION BOOK

VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

Victorian Certificate of Education 2003

STUDENT NUMBER

Figures										Letter
Words										

MATHEMATICAL METHODS (CAS)
PILOT STUDY
Written examination 1
(Facts, skills and applications)

Friday 7 November 2003

Reading time: 9.00 am to 9.15 am (15 minutes)
Writing time: 9.15 am to 10.45 am (1 hour 30 minutes)

PART II
QUESTION AND ANSWER BOOK

This examination 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 this 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.

Structure of book

Number of questions	*Number of questions to be answered*	*Number of marks*
6	6	23

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers, a protractor, set-squares, aids for curve sketching, up to four pages (two A4 sheets) of pre-written notes (typed or handwritten) and one approved CAS calculator (memory may be retained) and/or one scientific calculator. For the TI-92, Voyage 200 or approved computer based CAS, their full functionality and/or one scientific calculator may be used, but other programs or files are not permitted.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or white out liquid/tape.

Materials supplied

- Question and answer book of 8 pages.

Instructions

- Detach the formula sheet from the centre of the Part I book during reading time.
- Write your **student number** in the space provided above on this page.
- All written responses must be in English.

At the end of the examination

- Place the answer sheet for multiple-choice questions (Part I) inside the front cover of this question and answer book.

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

Working space

Instructions for Part II

- Answer **all** questions in the spaces provided.
- A decimal approximation will not be accepted if an exact answer is required to a question.
- In questions where more than 1 mark is available, appropriate working must be shown.
- Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Question 1

Let $f: R \to R, f(x) = ax^2 + bx + c$, where a, b and c are real numbers and $a \neq 0$.

Suppose that $f(1) = 6$ and $f'(1) = 4$.

a. Find the values of a and b in terms of c.

b. Suppose $\int_0^1 f(x)\,dx = 6$. Find the value of c.

2 + 2 = 4 marks

Question 2

Find the **exact** solutions of the equation $\sin(2\pi x) = -\sqrt{3}\cos(2\pi x)$, $0 \leq x \leq 1$.

2 marks

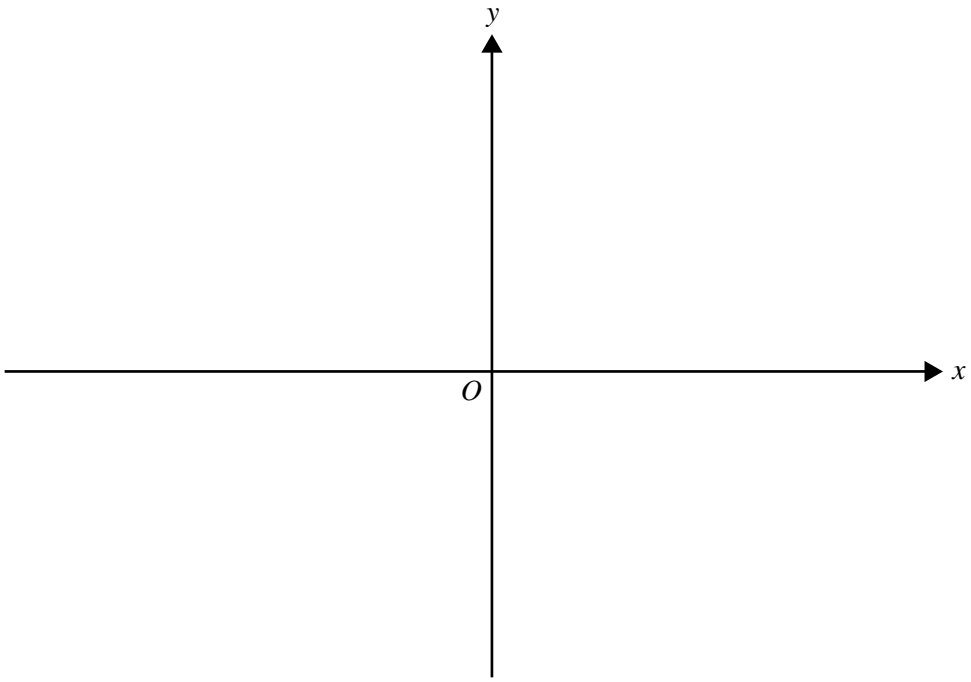
Question 3

Let $f : D \to R, f(x) = 2\log_e(|x+3|) + 1$, where D is the maximal domain of f.

a. State D.

b. Find the **exact coordinates** of the points where the graph of $y = f(x)$ intersects the x- and y-axes.

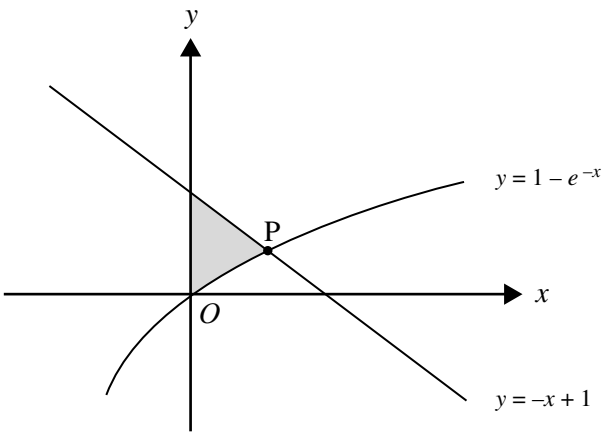
c. Sketch the graph of $y = f(x)$ on the axes below. Indicate any asymptote with its equation.



1 + 3 + 2 = 6 marks

Question 4

The graphs with equations $y = -x + 1$ and $y = 1 - e^{-x}$ are shown below. The graphs intersect at the point P which has x-coordinate k.



a. Find the value of k, correct to three decimal places.

b. Write down a definite integral, the value of which is the area of the shaded region.

c. Hence find the area of the shaded region, correct to two decimal places.

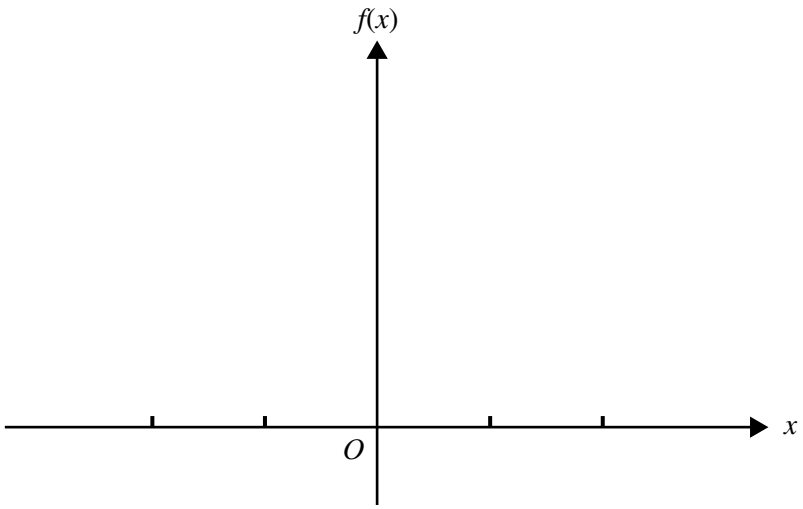
1 + 1 + 1 = 3 marks

Question 5

The probability density function of the continuous random variable X is given by

$f(x) = a(2 - |x|)$, for $-2 < x < 2$ and 0 elsewhere (where a is a real constant).

a. On the axes provided sketch the graph of this probability density function.



b. Find the value of a.

2 + 2 = 4 marks

Question 6

Kim goes to the sports centre each evening and either works out in the gym or has a swim. She never has a swim two evenings in a row. If she has a work-out in the gym one evening, then the next evening she is twice as likely to have a swim as she is to have a work-out in the gym. On a particular Monday evening, she works out in the gym.

a. What is the probability that she works out in the gym on both the Tuesday and Wednesday evenings of that week?

b. What is the probability that she has a swim on the Friday of that week?

1 + 3 = 4 marks

END OF PART II QUESTION AND ANSWER BOOK

MATHEMATICAL METHODS (CAS)

PILOT STUDY

Written examinations 1 and 2

FORMULA SHEET

Directions to students

Detach this formula sheet during reading time.

This formula sheet is provided for your reference.

Mathematical Methods CAS Formulas

Mensuration

area of a trapezium: $\frac{1}{2}(a+b)h$

curved surface area of a cylinder: $2\pi rh$

volume of a cylinder: $\pi r^2 h$

volume of a cone: $\frac{1}{3}\pi r^2 h$

volume of a pyramid: $\frac{1}{3}Ah$

volume of a sphere: $\frac{4}{3}\pi r^3$

area of a triangle: $\frac{1}{2}bc\sin A$

Calculus

$\frac{d}{dx}\left(x^n\right) = nx^{n-1}$

$\frac{d}{dx}\left(e^{ax}\right) = ae^{ax}$

$\frac{d}{dx}\left(\log_e(x)\right) = \frac{1}{x}$

$\frac{d}{dx}\left(\sin(ax)\right) = a\cos(ax)$

$\frac{d}{dx}\left(\cos(ax)\right) = -a\sin(ax)$

$\frac{d}{dx}\left(\tan(ax)\right) = \frac{a}{\cos^2(ax)} = a\sec^2(ax)$

approximation: $f(x+h) \approx f(x) + hf'(x)$

average value: $\frac{1}{b-a}\int_a^b f(x)dx$

$\int x^n dx = \frac{1}{n+1}x^{n+1} + c, n \neq -1$

$\int e^{ax}dx = \frac{1}{a}e^{ax} + c$

$\int \frac{1}{x}dx = \log_e|x| + c$

$\int \sin(ax)dx = -\frac{1}{a}\cos(ax) + c$

$\int \cos(ax)dx = \frac{1}{a}\sin(ax) + c$

product rule: $\frac{d}{dx}(uv) = u\frac{dv}{dx} + v\frac{du}{dx}$

chain rule: $\frac{dy}{dx} = \frac{dy}{du}\frac{du}{dx}$

quotient rule: $\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}$

Statistics

$\Pr(A) = 1 - \Pr(A')$

$\Pr(A \cup B) = \Pr(A) + \Pr(B) - \Pr(A \cap B)$

$\Pr(A|B) = \frac{\Pr(A \cap B)}{\Pr(B)}$

transition matrices: $S_n = T^n \times S_0$

mean: $\mu = \mathrm{E}(X)$

variance: $\mathrm{var}(X) = \sigma^2 = \mathrm{E}((X-\mu)^2) = \mathrm{E}(X^2) - \mu^2$

Discrete distributions

	$\Pr(X = x)$	mean	variance
general	$p(x)$	$\mu = \Sigma\, x\, p(x)$	$\sigma^2 = \Sigma\,(x-\mu)^2\, p(x)$ $= \Sigma\, x^2 p(x) - \mu^2$
binomial	${}^nC_x\, p^x (1-p)^{n-x}$	np	$np(1-p)$
hypergeometric	$\frac{{}^DC_x\, {}^{N-D}C_{n-x}}{{}^NC_n}$	$n\frac{D}{N}$	$n\frac{D}{N}\left(1-\frac{D}{N}\right)\left(\frac{N-n}{N-1}\right)$

Continuous distributions

	$\Pr(a < X < b)$	mean	variance
general	$\int_a^b f(x)dx$	$\mu = \int_{-\infty}^{\infty} x\, f(x)dx$	$\sigma^2 = \int_{-\infty}^{\infty}(x-u)^2 f(x)dx$ $= \int_{-\infty}^{\infty} x^2 f(x)dx - \mu^2$
normal	If X is distributed $\mathrm{N}(\mu, \sigma^2)$ and $Z = \frac{X-\mu}{\sigma}$, then Z is distributed $\mathrm{N}(0, 1)$, $f(z) = \frac{1}{\sqrt{2\pi}}e^{-\frac{1}{2}z^2}$		

Table 1 Normal distribution – cdf

	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359	4	8	12	16	20	24	28	32	36
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753	4	8	12	16	20	24	28	32	35
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141	4	8	12	15	19	23	27	31	35
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517	4	8	11	15	19	23	26	30	34
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879	4	7	11	14	18	22	25	29	32
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224	3	7	10	14	17	21	24	27	31
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549	3	6	10	13	16	19	23	26	29
0.7	.7580	.7611	.7642	.7673	.7703	.7734	.7764	.7793	.7823	.7852	3	6	9	12	15	18	21	24	27
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133	3	6	8	11	14	17	19	22	25
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389	3	5	8	10	13	15	18	20	23
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621	2	5	7	9	12	14	16	18	21
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830	2	4	6	8	10	12	14	16	19
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015	2	4	6	7	9	11	13	15	16
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177	2	3	5	6	8	10	11	13	14
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319	1	3	4	6	7	8	10	11	13
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441	1	2	4	5	6	7	8	10	11
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545	1	2	3	4	5	6	7	8	9
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633	1	2	3	3	4	5	6	7	8
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706	1	1	2	3	4	4	5	6	6
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767	1	1	2	2	3	4	4	5	5
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817	0	1	1	2	2	3	3	4	4
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857	0	1	1	2	2	2	3	3	4
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890	0	1	1	1	2	2	2	3	3
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916	0	1	1	1	1	2	2	2	2
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936	0	0	1	1	1	1	1	2	2
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952	0	0	0	1	1	1	1	1	1
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964	0	0	0	0	1	1	1	1	1
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974	0	0	0	0	0	1	1	1	1
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981	0	0	0	0	0	0	0	1	1
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986	0	0	0	0	0	0	0	0	0
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990	0	0	0	0	0	0	0	0	0
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993	0	0	0	0	0	0	0	0	0
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995	0	0	0	0	0	0	0	0	0
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997	0	0	0	0	0	0	0	0	0
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998	0	0	0	0	0	0	0	0	0
3.5	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998	0	0	0	0	0	0	0	0	0
3.6	.9998	.9998	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	0	0	0	0	0	0	0	0	0
3.7	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	0	0	0	0	0	0	0	0	0
3.8	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	0	0	0	0	0	0	0	0	0
3.9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0	0	0	0	0	0	0	0	0

END OF FORMULA SHEET