VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

Victorian Certificate of Education
2004

MATHEMATICAL METHODS

Written examination 1
(Facts, skills and applications)

Friday 5 November 2004

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 an approved scientific and/or graphics calculator (memory must be retained).
- 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 13 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.

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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

Mollie has constructed a spinner that will randomly display an integer between 0 and 4, inclusive, with the following probabilities.

Number	x	0	1	2	3	4
Probability	$\Pr(X = x)$	0.2	0.3	0.15	0.25	0.1

If Mollie spins the spinner once, the probability of obtaining an odd number is

A. 0.075

B. 0.25

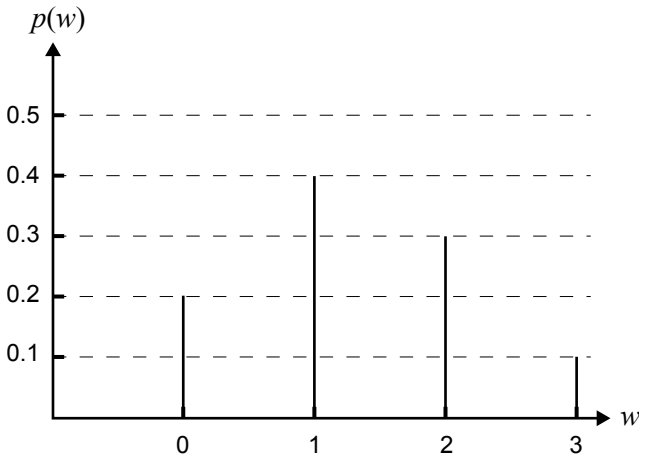
C. 0.55

D. 0.6

E. 0.75

Question 2

The graph of a probability distribution for the random variable w is shown below.



The expected value of w is equal to

A. 0.25

B. 1

C. 1.3

D. 1.5

E. 2.5

Question 3

Christopher has five pairs of identical purple socks and three pairs of identical green socks. His socks are randomly mixed in his drawer.

He takes two individual socks at random from the drawer in the dark.

The probability that he obtains a matching pair is

A. $\frac{1}{8}$

B. $\frac{5}{14}$

C. $\frac{3}{8}$

D. $\frac{13}{28}$

E. $\frac{1}{2}$

Question 4

A binomial random variable has mean 20 and variance 4.

The values of n and p respectively are

A. 22 and 0.9

B. 25 and 0.2

C. 25 and 0.8

D. 100 and 0.2

E. 100 and 0.8

Question 5

The random variable X has a normal distribution with mean 12.2 and standard deviation 1.4.

If Z has the standard normal distribution, then the probability that X is greater than 15 is equal to

A. $\Pr(Z < 2)$

B. $\Pr(Z > 2)$

C. $\Pr(Z > -2)$

D. $1 - \Pr(Z > 2)$

E. $1 - \Pr(Z < -2)$

Question 6

A sine function f has an amplitude of 3 and a period of $\frac{1}{10}$.
The rule for f could be

A. $f(t) = 3 \sin\left(\frac{\pi t}{5}\right)$

B. $f(t) = 3 \sin(20\pi t)$

C. $f(t) = 3 \sin(10t)$

D. $f(t) = 1.5 \sin\left(\frac{\pi t}{5}\right)$

E. $f(t) = 1.5 \sin(20\pi t)$

Question 7

The depth of water near the Lorne Pier changes with the tides according to the rule

$$h(t) = 7 - 2\sin\left(\frac{4\pi t}{25} + \frac{\pi}{2}\right)$$

where t is the time in hours after low tide and h is the depth in metres.
A low tide occurred at midnight.
The time of the **next high** tide is

A. 6.00 am
B. 6.15 am
C. 12.30 pm
D. 6.30 pm
E. 1.00 am on the next day

Question 8

The **sum** of the solutions of $\cos\left(\frac{x}{2}\right) = \frac{\sqrt{3}}{2}$, for $0 \le x \le 4\pi$, is

A. $\frac{\pi}{6}$

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

C. $\frac{11\pi}{3}$

D. 4π

E. 8π

Question 9

Which one of the following is a **complete** set of **linear** factors of the third degree polynomial $ax^3 - bx$, where a and b are positive real numbers?

A. $x, ax^2 - b$

B. $x, ax - b, ax + b$

C. $x, \sqrt{ax - b}$

D. $x, \sqrt{a}\,x - b, \sqrt{a}\,x + b$

E. $x, \sqrt{a}\,x - \sqrt{b}, \sqrt{a}\,x + \sqrt{b}$

Question 10

Which one of the following functions does **not** have an inverse function?

A. $f: [2, 4) \to R,\ f(x) = \sqrt{x-2}$

B. $g: R\backslash\{0\} \to R, g(x) = \dfrac{1}{x^2}$

C. $h: R^+ \to R, h(x) = x^3$

D. $k: (-\infty, 0] \to R, k(x) = x^2 + 1$

E. $m: R^+ \to R, m(x) = \dfrac{1}{x+3}$

Question 11

If $5e^{ax} = 2$, then x is equal to

A. $0.4 \log_e(a)$

B. $a \log_e(0.4)$

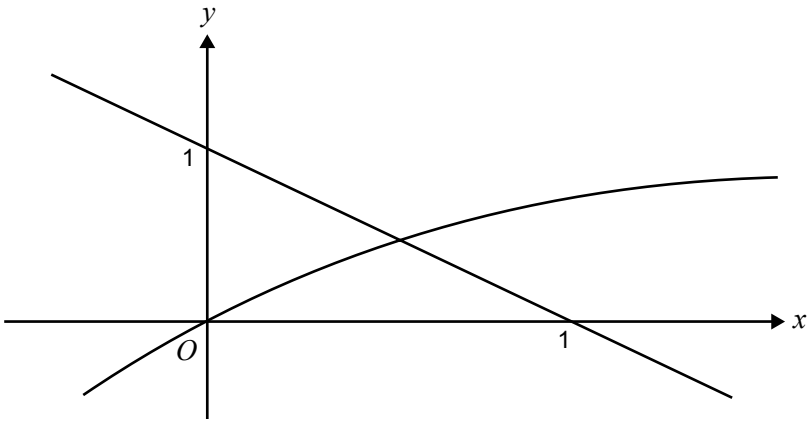
C. $\dfrac{\log_e(0.4)}{a}$

D. $\dfrac{a \log_e(2)}{\log_e(5)}$

E. $\dfrac{\log_e(2)}{a \log_e(5)}$

Question 12

Parts of the graphs of the functions with equations $y = \log_e(x + 1)$ and $y = 1 - x$ are shown below.



The solution of the equation $\log_e(x + 1) = 1 - x$ is closest to

A. 0.44

B. 0.45

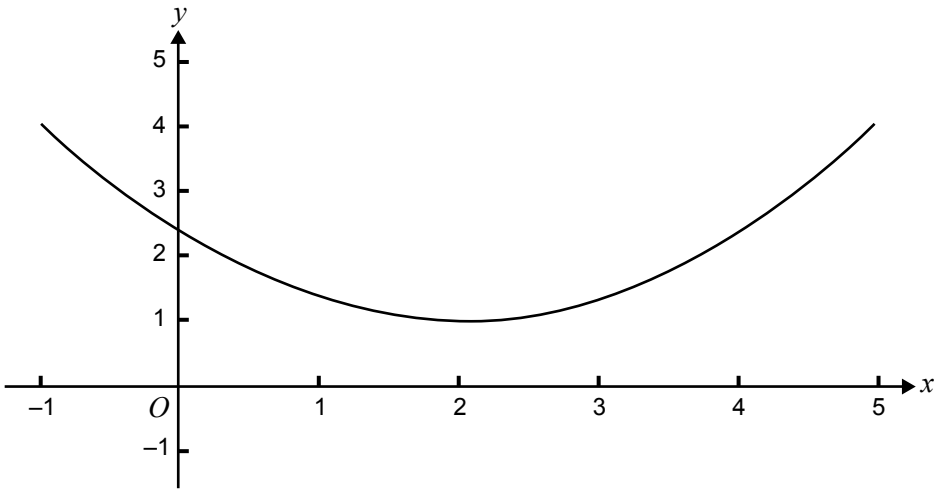
C. 0.55

D. 0.56

E. 0.57

Question 13

The following shows part of the graph of the curve with equation $y = P(x - Q)^2 + 1$.



The values of P and Q respectively could be

	P	Q
A.	$\frac{1}{3}$	–2
B.	$\frac{1}{3}$	2
C.	1	2
D.	3	–2
E.	3	2

Question 14

Let f be a polynomial function of degree 3. The graph of the curve with rule $y = f(x)$ either intersects or touches the x-axis at exactly two points $(a, 0)$ and $(b, 0)$.

A possible rule for f could be

A. $f(x) = (x - a)(x - b)$

B. $f(x) = (x - a)(x + b)^2$

C. $f(x) = (x - a)(x - b)^2$

D. $f(x) = (x + a)^2(x - b)$

E. $f(x) = (x + a)^2(x + b)$

Question 15

Which one of the following is **not** true of the graph of the function f with rule $f(x) = 2^x$?

A. It has range R^+

B. It has domain R

C. It has a horizontal asymptote at $y = 0$

D. It passes through the point $(0, 2)$

E. The slope of the tangent at any point on the graph is positive.

Question 16

The graph of the curve with rule $y = f(x)$, where f is a one-to-one function, has exactly one asymptote whose equation is $x = 3$.

The graph of the curve with rule $y = f^{-1}(x)$, where f^{-1} is the inverse function of f, will have

A. a horizontal asymptote at $y = -3$

B. a horizontal asymptote at $y = \frac{1}{3}$

C. a horizontal asymptote at $y = 3$

D. a vertical asymptote at $x = \frac{1}{3}$

E. a vertical asymptote at $x = 3$

Question 17

The graph of the function f with rule $f(x) = \cos(x)$ is transformed to the graph of the function g with rule $g(x) = 5\cos(3x)$ by

A. a dilation from the x-axis by a scale factor of 5 and a dilation from the y-axis by a scale factor of 3

B. a dilation from the x-axis by a scale factor of 3 and a dilation from the y-axis by a scale factor of 5

C. a dilation from the x-axis by a scale factor of $\frac{1}{3}$ and a dilation from the y-axis by a scale factor of 5

D. a dilation from the x-axis by a scale factor of $\frac{1}{5}$ and a dilation from the y-axis by a scale factor of 3

E. a dilation from the x-axis by a scale factor of 5 and a dilation from the y-axis by a scale factor of $\frac{1}{3}$

Question 18

At $x = -1$, the graph of the function f, with rule $f(x) = (x + 1)^3(x - 1) + 4$ has a

A. x-axis intercept.

B. y-axis intercept.

C. local minimum.

D. local maximum.

E. point of inflection with zero gradient.

Question 19

If $y = x^2 + 2x + 4$, the rate of change of y with respect to x at $x = k$ is

A. $2k + 2$

B. $2k + 6$

C. $k^2 + 2k$

D. $k^2 + 2k + 4$

E. $\frac{k^3}{3} + k^2 + 4k$

Question 20

The number of ants, N, in a colony varies with time according to the rule $N(t) = 1000e^{0.1t}$, where t is the time measured in days.

The **average** rate of change in the number of ants over the first 10 days is closest to

A. 172

B. 183

C. 272

D. 1718

E. 2718

Question 21

Using the approximation formula $f(x + h) \approx f(x) + hf'(x)$, with $f(x) = x^3$ and $x = 2$, an approximate value of 1.8^3 is given by

A. $f(2) + 0.2f'(2)$

B. $f(8) + 0.2f'(8)$

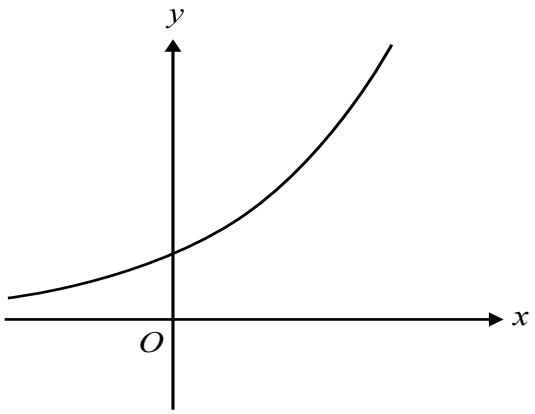
C. $f(2) - f(1.8)$

D. $f(2) - 0.2f'(2)$

E. $f(8) - 0.2f'(8)$

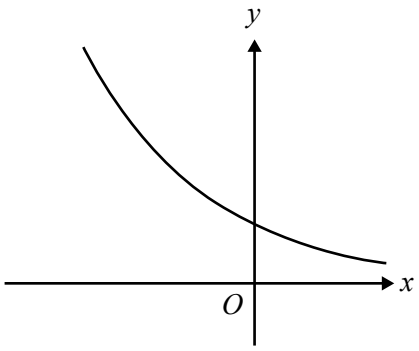
Question 22

The graph of the function f with rule $y = f(x)$ is shown below.

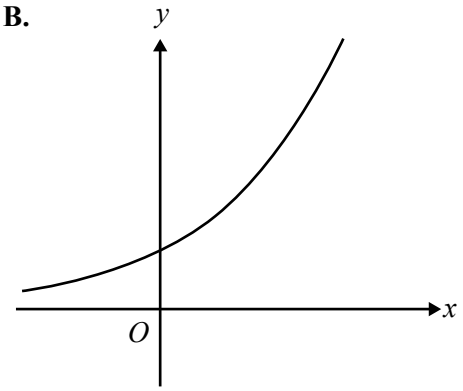


Which one of the following could be the graph of $y = f'(x)$?

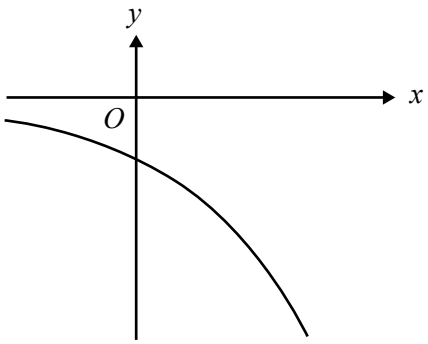
A.



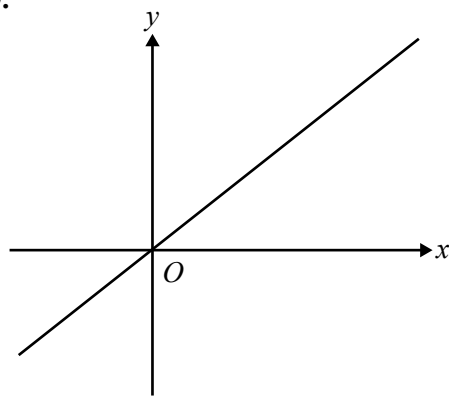
B.



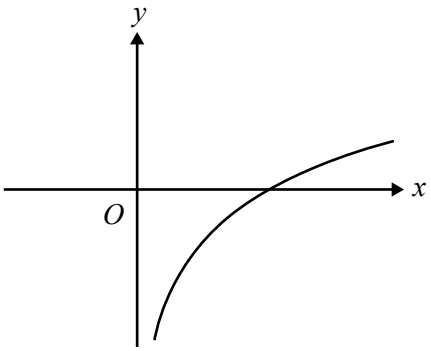
C.



D.

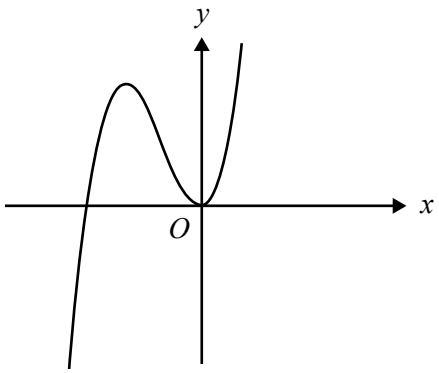


E.



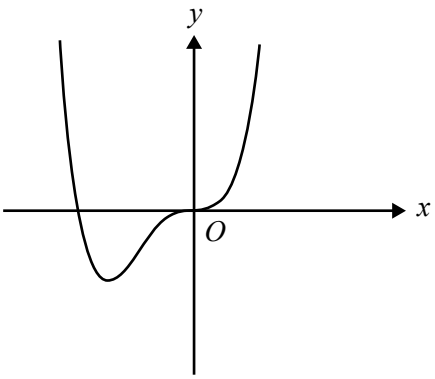
Question 23

The graph of the function f with rule $y = f(x)$ is shown below.

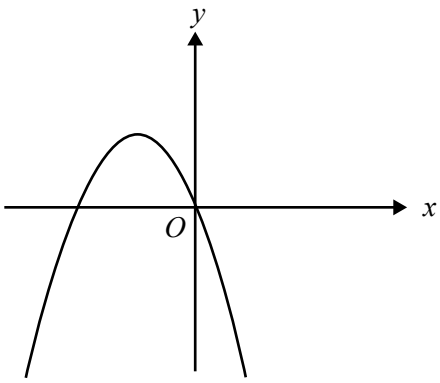


Which one of the following is most likely to be the graph of an antiderivative function of f?

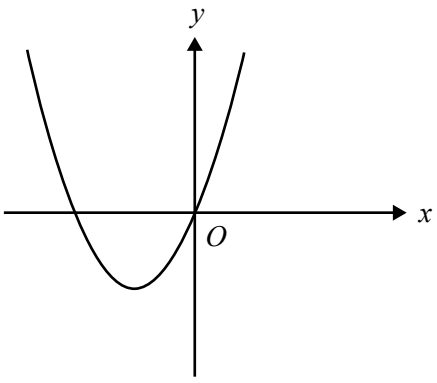
A.



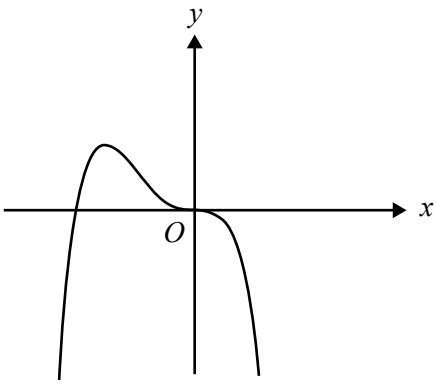
B.



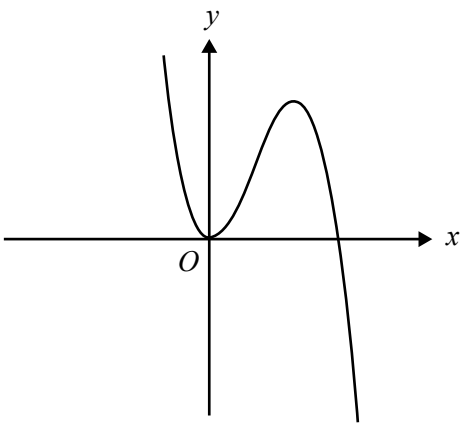
C.



D.



E.



Question 24

Using the **right rectangle approximation** with rectangles of width one unit, the area of the region bounded by the x-axis, the y-axis, the line $x = 3$ and the curve with equation $y = x^3 + 1$ is approximated by

A. 12

B. 23

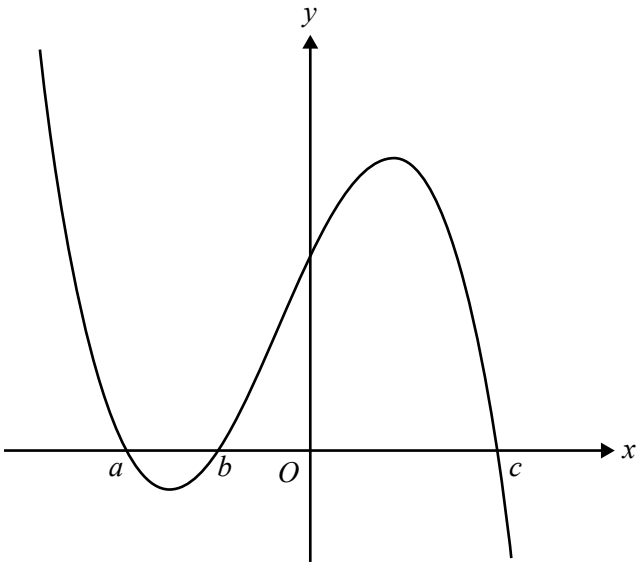
C. 27

D. 39

E. 40

Question 25

The graph of the function f with rule $y = f(x)$ is shown below.



The total area bounded by the curve with equation $y = f(x)$ and the x-axis on the interval $[a, c]$ is given by

A. $\int_a^c f(x)\,dx$

B. $\int_a^b f(x)\,dx + \int_b^c f(x)\,dx$

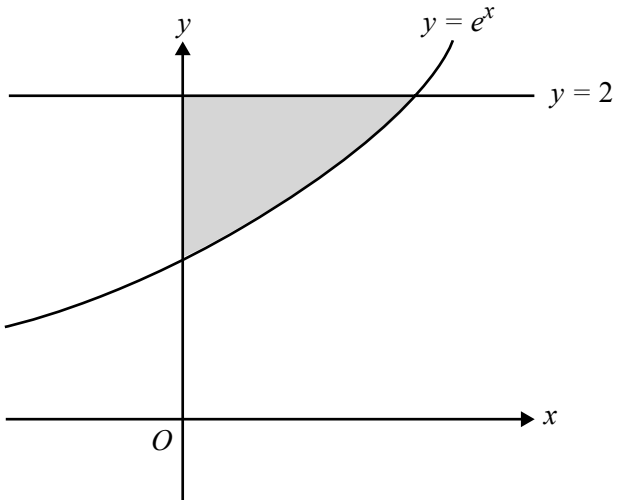
C. $-\int_a^b f(x)\,dx + \int_b^c f(x)\,dx$

D. $-\int_a^0 f(x)\,dx + \int_0^c f(x)\,dx$

E. $-\int_a^b f(x)\,dx - \int_b^0 f(x)\,dx - \int_0^c f(x)\,dx$

Question 26

Parts of the graphs with equations $y = e^x$ and $y = 2$ are shown below.



The total area, bounded by the y-axis, the line $y = 2$ and the curve with equation $y = e^x$ is given by

A. $\int_0^{e^2} \left(e^x - 2\right) dx$

B. $\int_0^{e^2} \left(2 - e^x\right) dx$

C. $\int_0^{\log_e(2)} \left(e^x - 2\right) dx$

D. $\int_0^{\log_e(2)} \left(2 - e^x\right) dx$

E. $\int_0^{2} \left(e^x - 2\right) dx$

Question 27

If $\int_0^{1.5} \frac{1}{2x+1} dx = \log_e(k)$, then k is equal to

A. 2

B. 3

C. 4

D. 15

E. 16

END OF PART I MULTIPLE-CHOICE QUESTION BOOK

VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

Victorian Certificate of Education 2004

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

STUDENT NUMBER

Figures										Letter
Words										

MATHEMATICAL METHODS

Written examination 1

(Facts, skills and applications)

Friday 5 November 2004

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 an approved scientific and/or graphics calculator (memory must be retained).
- 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 7 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 (Part II).

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

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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.

Where an **exact** answer is required to a question, appropriate working must be shown.

In questions where more than 1 mark is available, appropriate working must be shown.

Where an instruction to **use calculus** is stated for a question, you must show an appropriate derivative or antiderivative.

Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Question 1

The diameters of circular mats produced by a machine are normally distributed, with mean 12 cm and standard deviation 1.5 cm.

a. Sketch the normal distribution curve for the diameters of the circular mats produced by the machine.

b. It is known that exactly 16.00 % of mats produced by the machine have a diameter less than k cm. Find the value of k, correct to one decimal place.

2 + 1 = 3 marks

Question 2

a. The graph of g is obtained from the graph of the function f with rule $f(x) = x^2$ by a translation by +3 units parallel to the x-axis. Write down the rule for g.

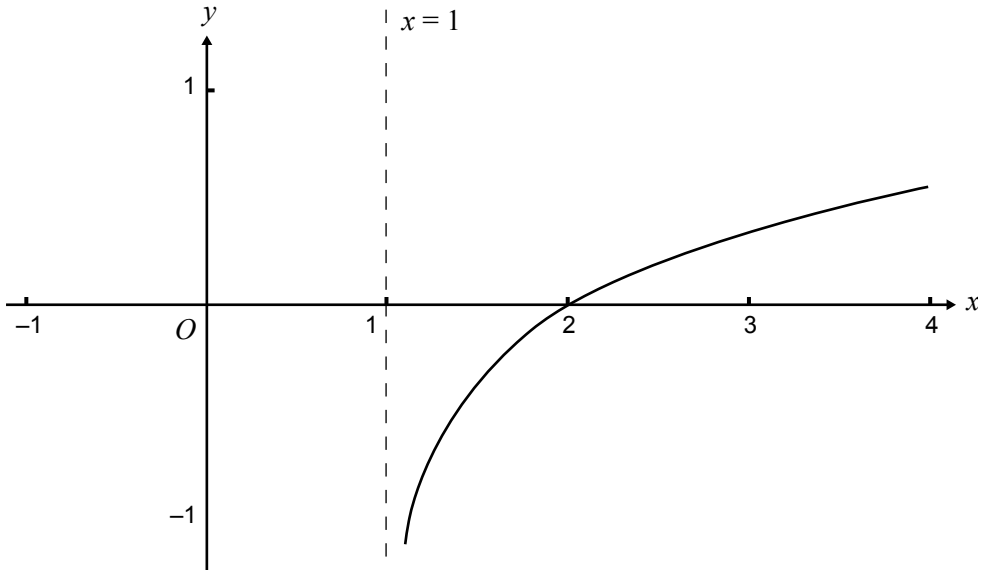
b. The graph of h is obtained from the graph of g by a translation by –1 unit parallel to the y-axis. Write down the rule for h.

c. The graph of k is obtained from the graph of h by a dilation by a scale factor of 0.5 from the y-axis. Write down the rule for k.

1 + 1 + 1 = 3 marks

Question 3

The graph of the function $f\colon (1, \infty) \to R,\ f(x) = 0.5 \log_e(x - 1)$ is shown below.



a. State the domain and range of f.

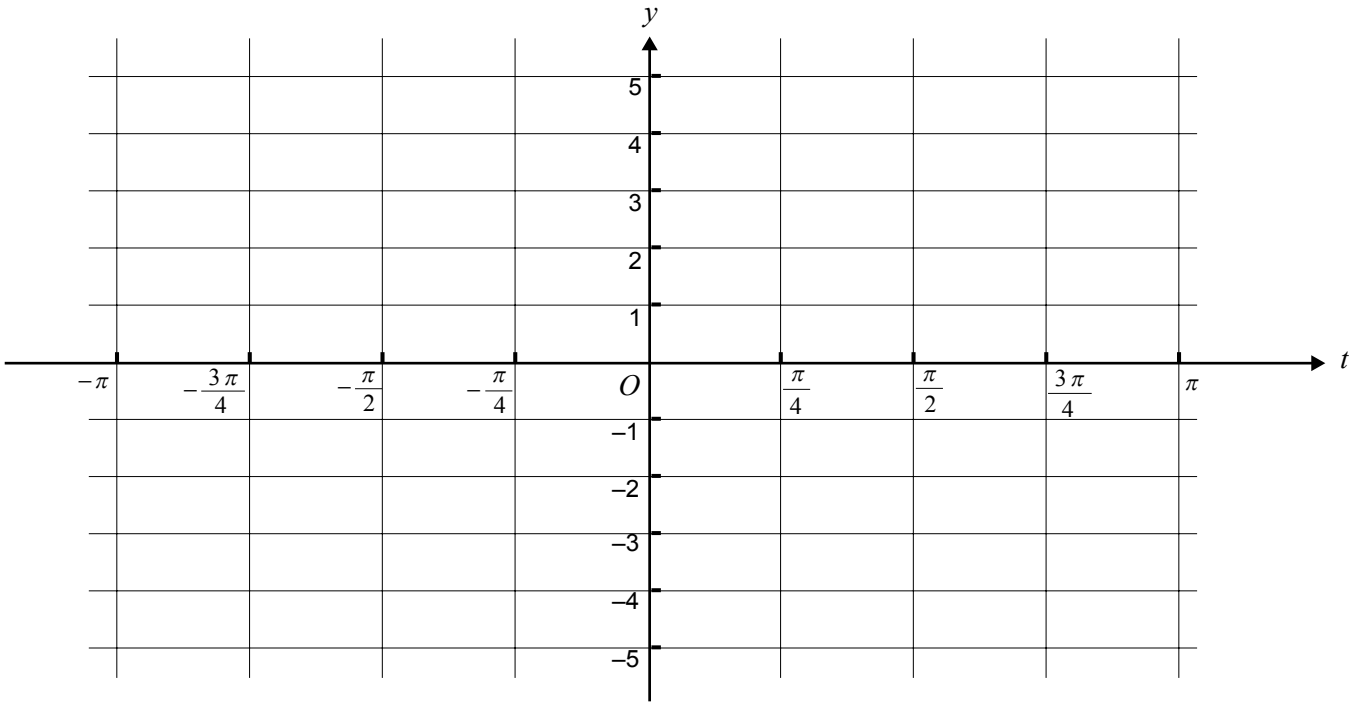
b. State why the inverse function of f exists.

c. Find the rule for the inverse function, f^{-1}.

1 + 1 + 2 = 4 marks

Question 4

a. On the set of axes below, sketch the graph of the function with rule $y = 3\sin(2(t - \frac{\pi}{4}))$, $-\pi \leq t \leq \pi$.



b. State the number of solutions to the equation $3\sin(2(t - \frac{\pi}{4})) = 1$, where $-\pi \leq t \leq \pi$.

_____

2 + 1 = 3 marks

Question 5

Let $f: R \rightarrow R$ be a continuous function with the following properties.

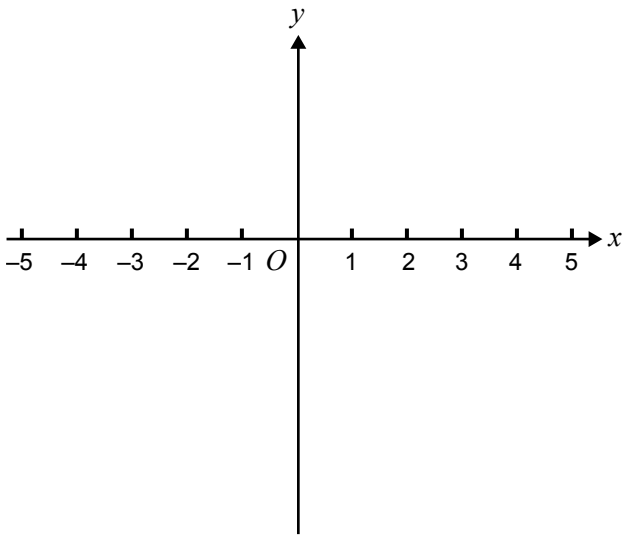
$f(0) = 0 \quad f'(0) = 0$

$f(4) = 0 \quad f'(3) = 0$

$f'(x) < 0$ for $(-\infty, 0) \cup (0, 3)$

$f'(x) > 0$ for $(3, \infty)$

a. On the set of axes provided below, sketch a possible graph of f



b. If $f(x) = ax^3(x - b)$ and the point $(2, -4)$ also lies on the graph of f, find the values of a and b.

c. Use calculus to find the equation of the tangent to the graph of f at the point where $x = 4$.

2 + 2 + 3 = 7 marks

Question 6

A barrel contains 100 balls, some of which are rainbow-coloured. Four balls are randomly selected from the barrel, **with replacement** (that is, a ball is selected, its colour noted, and the ball replaced **before** the next ball is selected).

Let p be the proportion of rainbow-coloured balls in the barrel.

a. Write down an expression for the probability that exactly one of the four balls selected is rainbow-coloured.

b. Use calculus to find the exact value of p for which this probability will be a maximum.

1 + 2 = 3 marks

END OF PART II QUESTION AND ANSWER BOOK

MATHEMATICAL METHODS

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 Formulas

Mensuration

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

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

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

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

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

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

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

Calculus

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

$$\frac{d}{dx}\left(e^{ax}\right) = ae^{ax} \qquad \int e^{ax} dx = \frac{1}{a}e^{ax} + c$$

$$\frac{d}{dx}\left(\log_e(x)\right) = \frac{1}{x} \qquad \int \frac{1}{x} dx = \log_e(x) + c, \text{for } x > 0$$

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

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

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

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

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

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

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

Statistics and Probability

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

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

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

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	$p(x)$	$\mu = \sum x\,p(x)$	$\sigma^2 = \sum (x-\mu)^2 p(x)$ $= \sum x^2 p(x) - \mu^2$
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			
normal	If X is distributed N(μ, σ^2) and $Z = \frac{X-\mu}{\sigma}$, then Z is distributed N(0, 1).		

Table 1 Normal distribution – cdf

x	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