VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

Victorian Certificate of Education
2005

MATHEMATICAL METHODS (CAS)

PILOT STUDY

Written examination 1

(Facts, skills and applications)

Friday 4 November 2005

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 DOES NOT need to be cleared) and, if desired, one scientific calculator. For the TI-92, Voyage 200 or approved computer based CAS, their full functionality 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 unauthorised electronic 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.

The following information refers to Questions 1 and 2.

The number, x, of hours per day that Tim spends cycling is a discrete random variable with probability distribution given in the table below.

x	0	1	2	3	4
$\Pr(X = x)$	$\frac{3}{30}$	$\frac{6}{30}$	$\frac{7}{30}$	$\frac{10}{30}$	$\frac{4}{30}$

Question 1

The proportion of days on which Tim spends more than one hour cycling is equal to

A. $\frac{7}{30}$

B. $\frac{14}{30}$

C. $\frac{17}{30}$

D. $\frac{21}{30}$

E. $\frac{27}{30}$

Question 2

The mean number of hours per day that Tim spends cycling is equal to

A. $\frac{27}{30}$

B. $\frac{66}{30}$

C. $\frac{69}{30}$

D. $\frac{188}{30}$

E. 66

Question 3

The 0.95 quantile for the standard normal probability distribution is approximately equal to

A. −1.960

B. −1.645

C. 0

D. 1.645

E. 1.960

Question 4

At a party there are six unmarked boxes. Two boxes each have prizes, the other four boxes are empty. When two boxes are selected without replacement, the probability of selecting at least one box with a prize is

A. $\frac{1}{15}$

B. $\frac{6}{15}$

C. $\frac{8}{15}$

D. $\frac{5}{9}$

E. $\frac{9}{15}$

Question 5

During a holiday, Mark and John play a total of n games of golf. The probability that John wins any game is 0.3. No games are drawn.

If the probability that John wins no games is 0.0576, correct to four decimal places, the total number of games that they play is

A. 1

B. 2

C. 5

D. 8

E. 12

Question 6

If the system of equations

$$x + ay + b = 0$$
$$2x + cy + d = 0$$

in the variables x and y, where a, b, c and d are real constants has infinitely many solutions, then

A. $c = 2a$ and $b = d$

B. $a = c$ and $b = d$

C. $a = c$ and $b = -d$

D. $a = 2c$ and $b = 2d$

E. $c = 2a$ and $d = 2b$

Question 7

The function $f: [a, \infty) \rightarrow R$ with rule $f(x) = 2(x - 3)^2 + 1$ will have an inverse function if

A. $a \leq -3$

B. $a \geq -3$

C. $a \geq 1$

D. $a \leq 3$

E. $a \geq 3$

Question 8

The solution of the equation $3e^{2x} = 4$ is closest to

A. –0.406

B. –0.405

C. 0.143

D. 0.144

E. 0.575

Question 9

The function f has the property that

$$f(x) + f(y) = (x + y) f(xy)$$

for all non-zero real numbers x and y.

A possible rule for f is

A. $f(x) = 2x$

B. $f(x) = 5 - 2x$

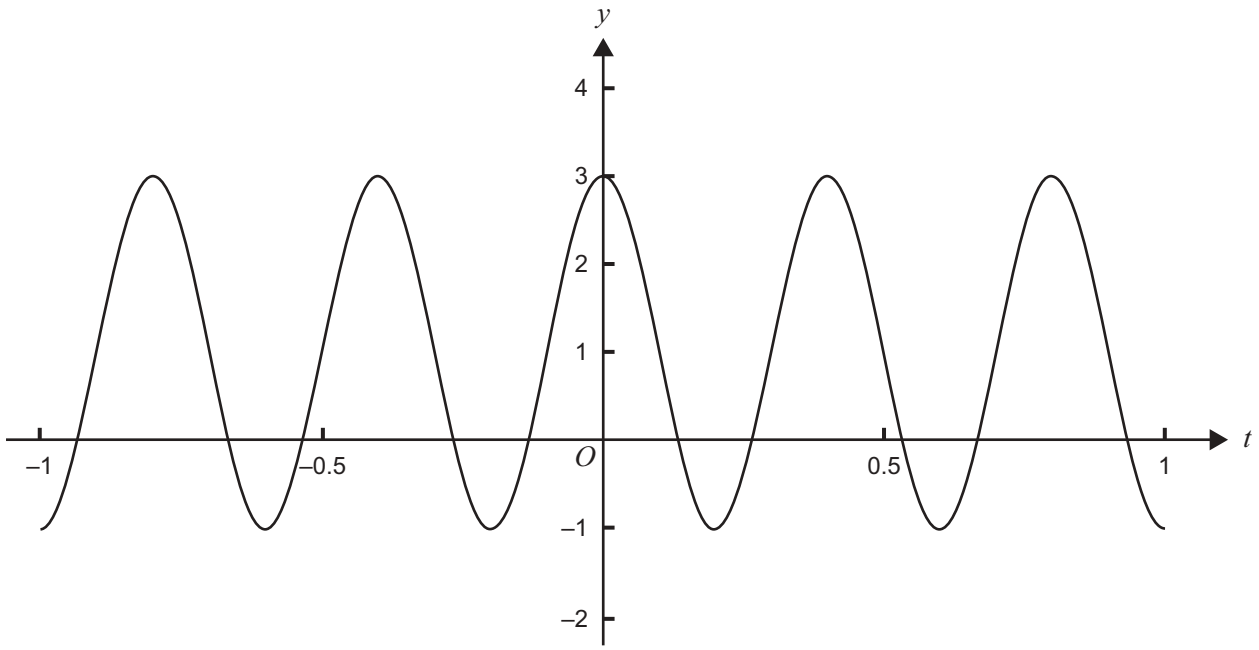
C. $f(x) = \frac{1}{x}$

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

E. $f(x) = \log_e(x)$

Question 10

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



The rule for f could be

A. $f(t) = 2\cos(5\pi t) + 1$

B. $f(t) = 2\sin(5\pi t) + 1$

C. $f(t) = \cos(5\pi t) + 2$

D. $f(t) = \sin(5t) + 2$

E. $f(t) = 2\cos(5t) + 1$

Question 11

The period of the graph of the function with rule $f(x) = \tan\left(\frac{x}{4}\right)$ is

A. $\frac{\pi}{4}$

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

C. π

D. 4π

E. 8π

Question 12

The **general** solution of $\cos(2x) = \sqrt{3}\sin(2x)$ is

A. $\frac{\pi}{12}$

B. $\frac{\pi}{12}, \frac{7\pi}{12}$

C. $\frac{\pi}{12} + k\frac{\pi}{2}, k \in N$

D. $\frac{\pi}{12} + k\frac{\pi}{2}, k \in Z$

E. $\frac{\pi}{12} + k\frac{\pi}{2}, k \in R$

Question 13

Let $f(x) = a\sin(x) + c$, where a and c are real constants and $a > 0$.

Then $f(x) < 0$ for all real values of x if

A. $c < -a$

B. $c > -a$

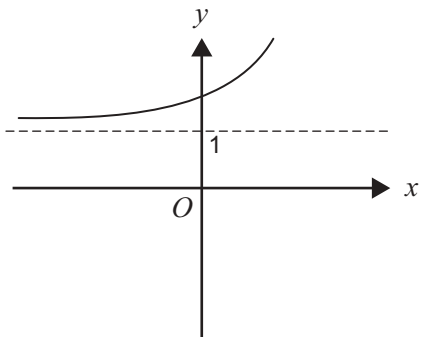
C. $c = 0$

D. $-a < c < a$

E. $c > a$

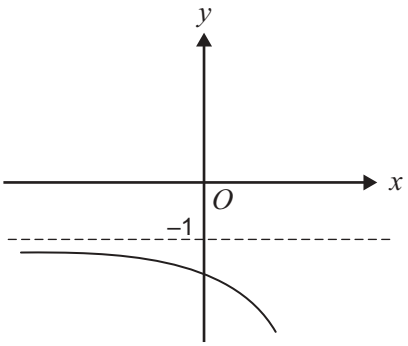
Question 14

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

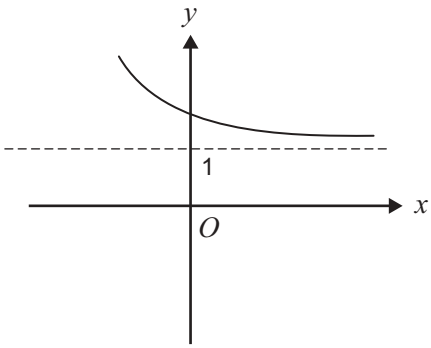


Which one of the following is most likely to be the graph of the inverse function f^{-1}?

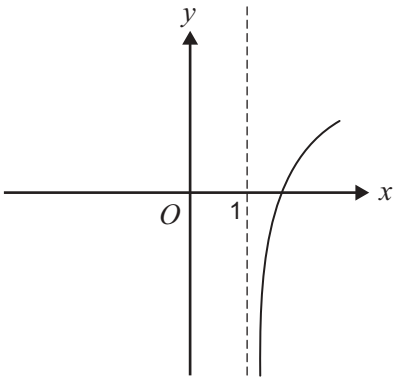
A.



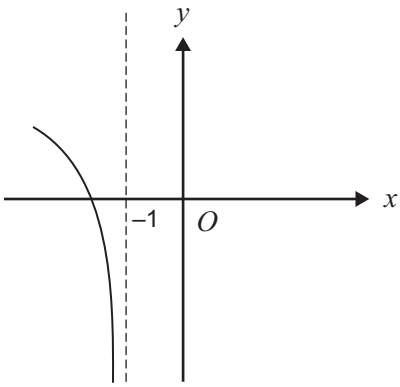
B.



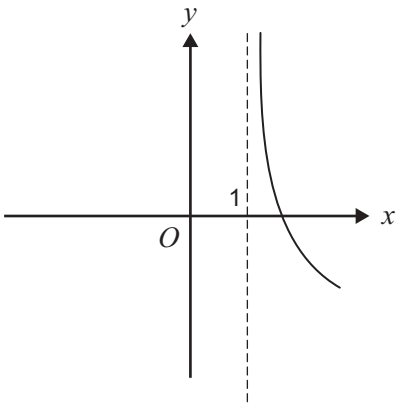
C.



D.



E.



Question 15

Under the transformation $T:R^2 \to R^2$ of the plane defined by

$$T\left(\begin{bmatrix} x \\ y \end{bmatrix}\right) = \begin{bmatrix} 0.5 & 0 \\ 0 & 1 \end{bmatrix}\left(\begin{bmatrix} x \\ y \end{bmatrix} + \begin{bmatrix} -2 \\ 0 \end{bmatrix}\right),$$

the image of the curve with equation $y = x^3$ has equation

A. $y = \frac{1}{2}(x-2)^3$

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

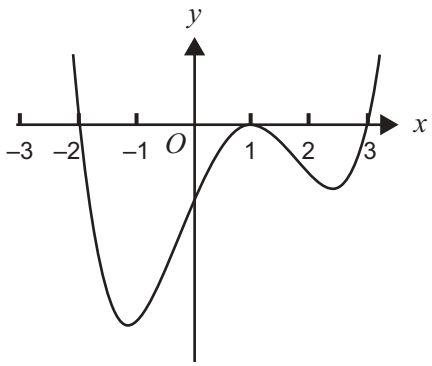
C. $y = \left(\frac{x}{2} - 2\right)^3$

D. $y = 8(x+2)^3$

E. $y = (2x+2)^3$

Question 16

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



The rule for f is most likely to be

A. $f(x) = (x + 2)(x - 1)^2(x - 3)$

B. $f(x) = (x - 2)(x + 1)^2(x + 3)$

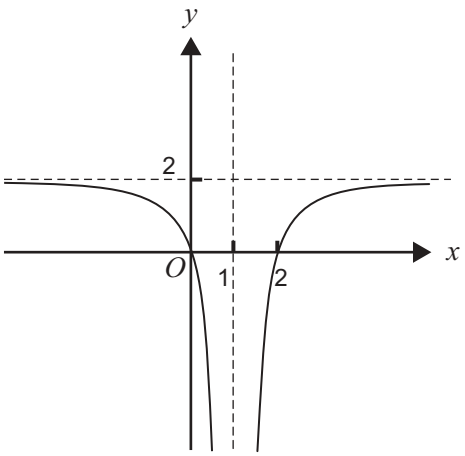
C. $f(x) = (2 - x)(x + 1)^2(x + 3)$

D. $f(x) = (x - 2)(x - 1)^2(x - 3)$

E. $f(x) = (x + 2)(x - 1)^2(3 - x)$

Question 17

Part of the graph of the function with rule $y = \dfrac{a}{(x+b)^2} + c$ is shown below.



The values of a, b and c respectively are

	a	b	c
A.	2	–1	0
B.	–2	–1	2
C.	2	1	1
D.	2	–2	1
E.	–2	1	2

Question 18

The graph of $y = \dfrac{x-2}{x+3}$ has two asymptotes with equations

A. $x = 3, \quad y = 1$

B. $x = 3, \quad y = -2$

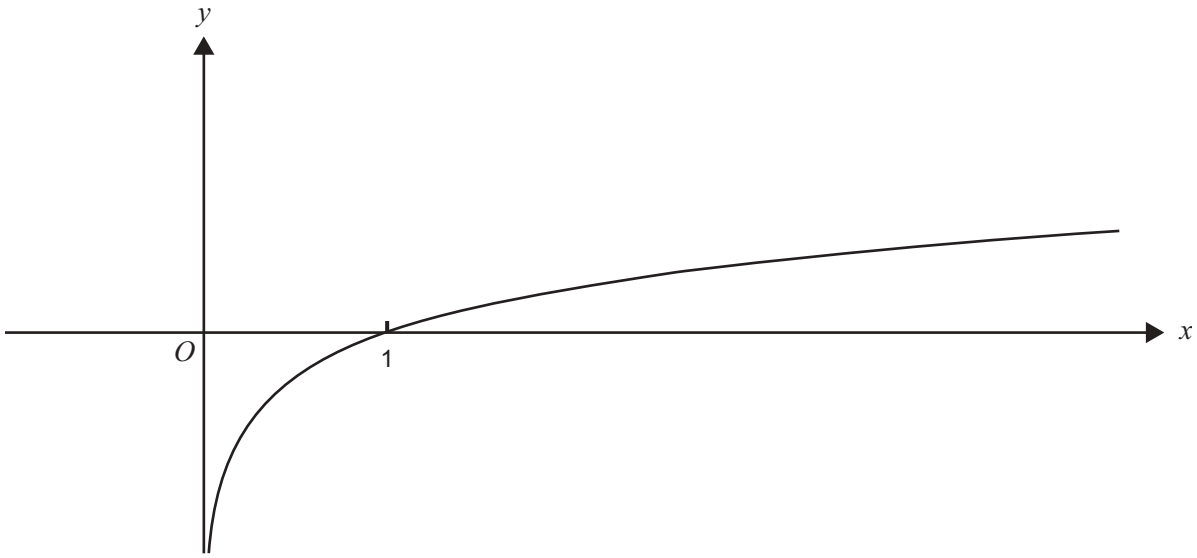
C. $x = -3, \quad y = 1$

D. $x = -3, \quad y = 2$

E. $x = -3, \quad y = -\dfrac{2}{3}$

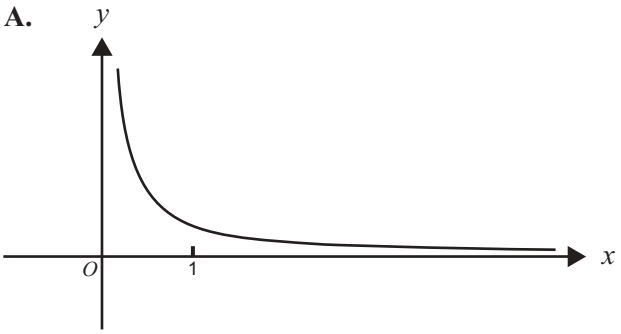
Question 19

The graph of the function $f: (0, \infty) \rightarrow R$, with rule $y = f(x)$, is shown below.

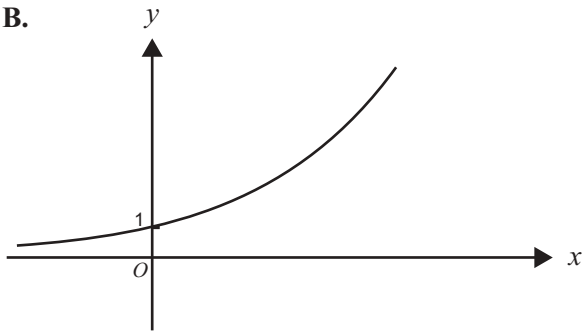


Which one of the following could be the graph of $y = f'(x)$?

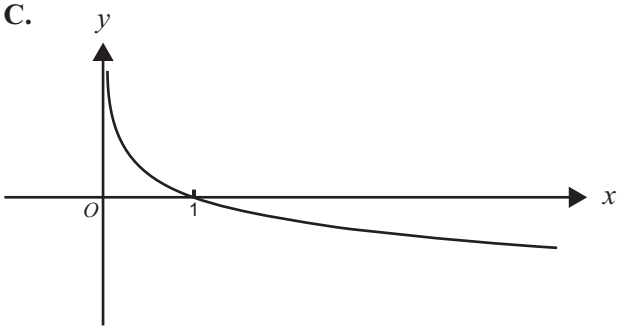
A.



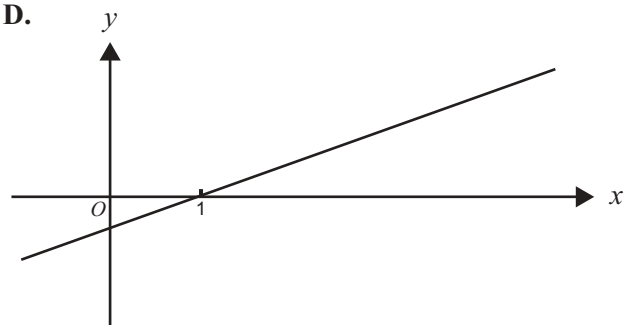
B.



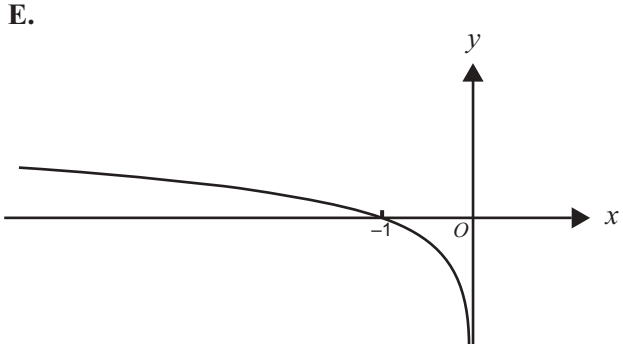
C.



D.



E.



Question 20

The average rate of change between $x = 0$ and $x = 1$ of the function with rule $f(x) = x^2 + e^x$ is

A. 0

B. 1

C. e

D. $1 + e$

E. $2 + e$

Question 21

If $y = |\cos(x)|$, the rate of change of y with respect to x at $x = k$, $\frac{\pi}{2} < k < \frac{3\pi}{2}$, is

A. $-\sin(k)$

B. $\sin(k)$

C. $-\cos(k)$

D. $-\sin(1)$

E. $\sin(1)$

Question 22

Let $f: R \to R$ be a differentiable function.

For all real values of x, the derivative of $f(e^{2x})$ with respect to x will be equal to

A. $2e^{2x}f'(x)$

B. $e^{2x}f'(x)$

C. $2e^{2x}f'(e^{2x})$

D. $2f'(e^{2x})$

E. $f'(e^{2x})$

Question 23

The equation of the normal to the graph of $y = 2x^4 - 4x^3$ at the point where $x = 2$ is

A. $y = -\frac{1}{16}$

B. $y = -\frac{1}{16}(x - 2)$

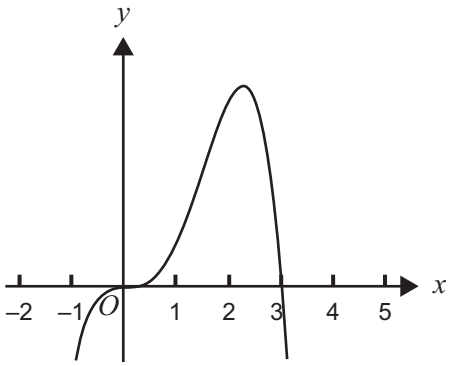
C. $y = 16$

D. $y = 16(x - 2)$

E. $y = (8x^3 - 12x^2)(x - 2)$

Question 24

Below is a sketch of the graph of $y = f(x)$, where $f: R \to R$ is a continuous and differentiable function.



A possible property of f', the derivative of f, is

A. $f'(x) < 0$ for $x \in (-\infty, 0) \cup (0, 2)$

B. $f'(x) > 0$ for $x \in (-\infty, 0) \cup (0, 2)$

C. $f'(x) > 0$ for $x \in (2, \infty)$

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

E. $f'(x) > 0$ for $x \in (0, 3)$

Question 25

For the function $f: [0, 2\pi] \to R$, where $f(x) = \sin(2x) + \cos(x)$, the number of solutions of the equation $f'(x) = -0.8$ is

A. 0

B. 1

C. 2

D. 3

E. 4

Question 26

If $\frac{dy}{dx} = \frac{3}{(2x-1)^{\frac{3}{2}}}$ and c is a real constant, then y is equal to

A. $\frac{-6}{(2x-1)^{\frac{1}{2}}} + c$

B. $\frac{-3}{(2x-1)^{\frac{1}{2}}} + c$

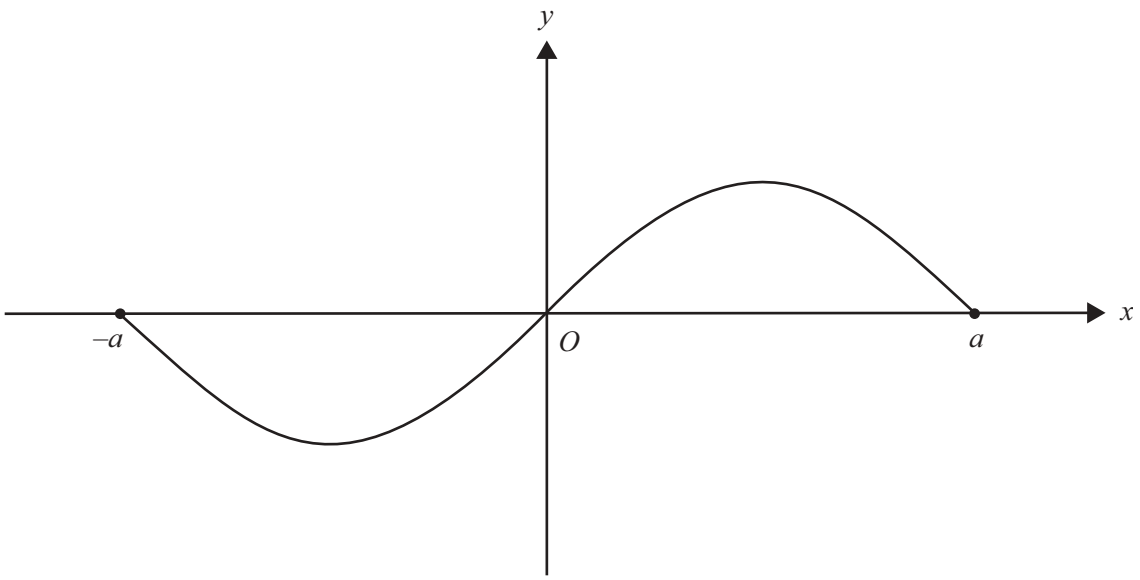
C. $\frac{-1}{(2x-1)^{\frac{1}{2}}} + c$

D. $\frac{-15}{(2x-1)^{\frac{5}{2}}} + c$

E. $\frac{-15}{2(2x-1)^{\frac{5}{2}}} + c$

Question 27

The graph of the function $f:[-a, a] \to R$, where a is a positive real constant, with rule $y = f(x)$ is shown below.



The function $G: [-a, a] \to R$ is defined by $G(t) = \int_0^t f(x)dx$.

Then $G(t) > 0$

A. for $t \in [-a, 0) \cup (0, a]$

B. for $t \in (0, a]$ only

C. for $t \in [0, a]$ only

D. for $t \in [-a, a]$

E. nowhere in $[-a, a]$

END OF PART I MULTIPLE-CHOICE QUESTION BOOK

VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

Victorian Certificate of Education 2005

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

STUDENT NUMBER

										Letter
Figures										
Words										

MATHEMATICAL METHODS (CAS) PILOT STUDY

Written examination 1

(Facts, skills and applications)

Friday 4 November 2005

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*
5	5	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 DOES NOT need to be cleared) and, if desired, one scientific calculator. For the TI-92, Voyage 200 or approved computer based CAS, their full functionality 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 unauthorised electronic 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.

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

The distribution of scores in a particular examination follows a normal distribution. 30% of scores are less than 45, and 30% of scores are greater than 55. Find the mean and standard deviation, correct to one decimal place, of the scores in the examination.

4 marks

Question 2

A continuous random variable X has a probability density function

$$f(x) = \begin{cases} \dfrac{a}{x^2} & for \quad x \geq a \\ 0 & elsewhere \end{cases}$$

where a is a positive real constant.

a. Explain why f is a probability density function.

b. Find $\Pr(X > 2a)$.

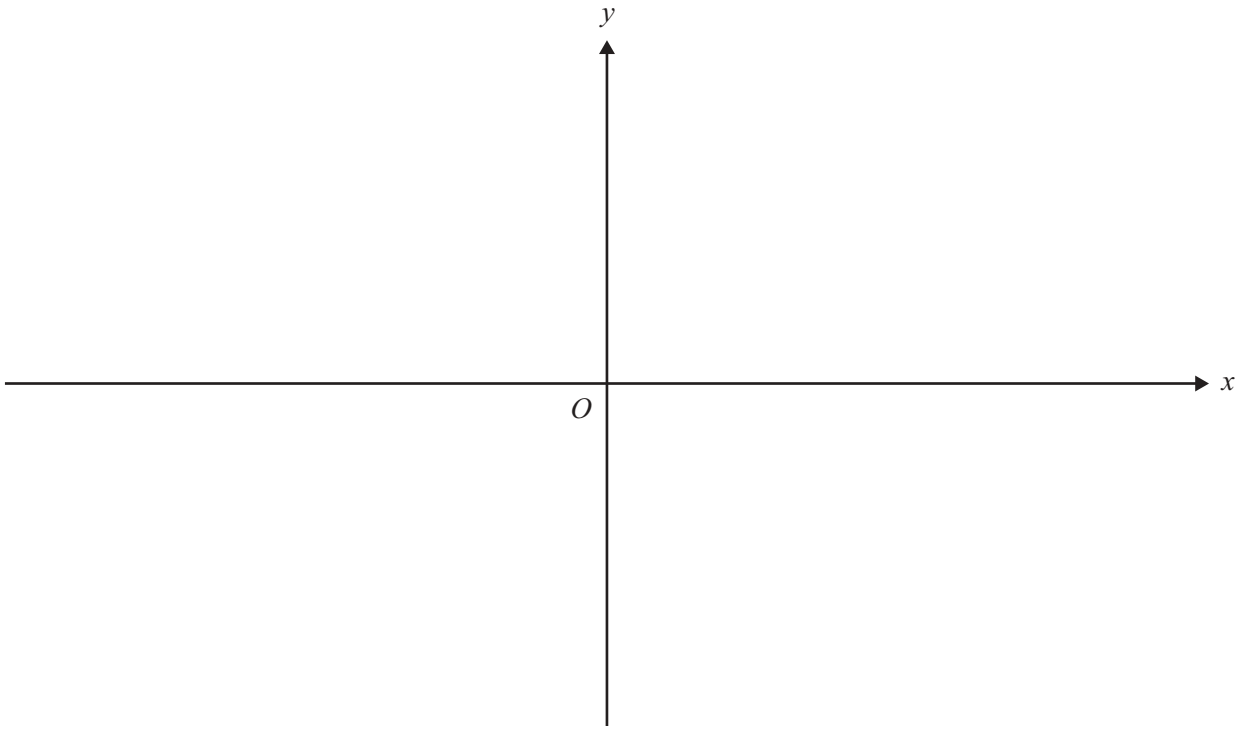
c. Write down the median of X.

2 + 2 + 1 = 5 marks

Question 3

A function f is defined by the rule $f(x) = \log_e(5 - x) + 1$.

a. Sketch the graph of f over its maximal domain on the axes below. Clearly label any intersections **with the axes with their exact coordinates** and any asymptotes **with their equations**.

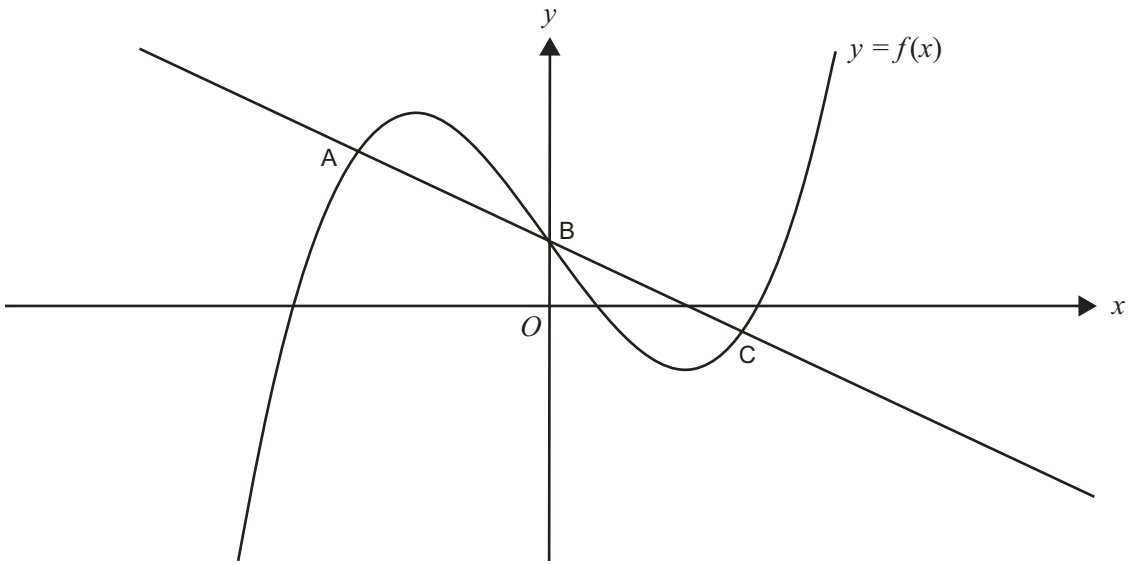


b. Find the rule for the inverse function f^{-1}.

3 + 2 = 5 marks

Question 4

Part of the graph of $y = f(x)$, where $f: R \to R$ is given below. For a fixed non-zero real constant p, the three points A, B and C, with coordinates $(-p, f(-p))$, $(0, f(0))$ and $(p, f(p))$ respectively, lie on a straight line.



a. Show that $\frac{f(-p)+f(p)}{2} = f(0)$.

b. Let $p = 1$, and let $f(x) = ax^3 + bx^2 + cx + d$, where a, b, c and d are real constants, and $a \neq 0$.

i. Show that $b = 0$.

ii. **Hence** show that $\frac{f(-x) + f(x)}{2} = f(0)$ for all $x \in R$.

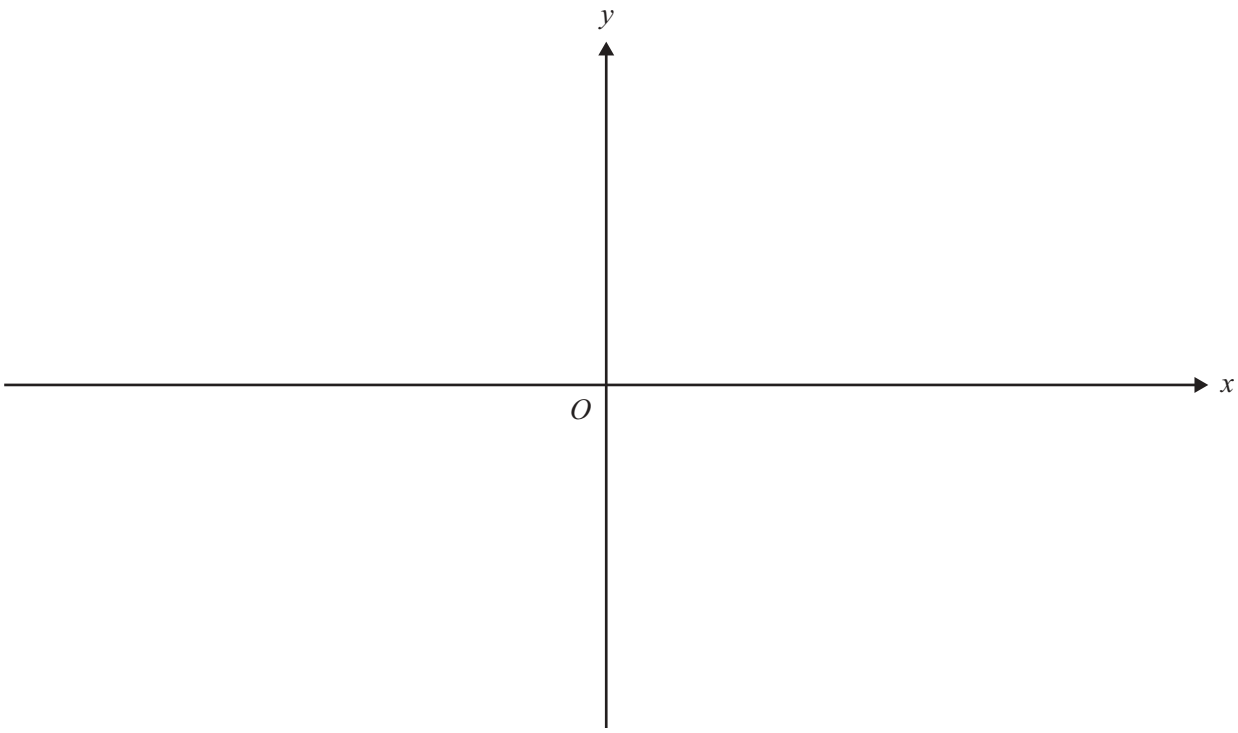
1 + (4 + 1) = 6 marks

Question 5

The graph of the function $f: R\backslash\{-1\} \rightarrow R$ has a vertical asymptote with equation $x = -1$ and a horizontal asymptote with equation $y = 2$. It also has the following properties.

- $f(0) = 0$
- $f(-4) = 0$
- $f'(x) > 0$ for all $x < -1$
- $f'(x) > 0$ for all $x > -1$

On the axes provided, sketch a possible graph of $y = f(x)$.



3 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: $\frac{1}{2}(a+b)h$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Probability

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

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

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

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	$p(x)$	$\mu = \sum x\,p(x)$	$\sigma^2 = \sum (x-\mu)^2 p(x)$ $= \sum x^2 p(x) - \mu^2$
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			
	$\Pr(a < X < b)$	mean	variance
general	$\int_a^b f(x)dx$	$\mu = \int_{-\infty}^{\infty} x\,f(x)dx$	$\sigma^2 = \int_{-\infty}^{\infty}(x-\mu)^2 f(x)dx$ $= \int_{-\infty}^{\infty} x^2 f(x)dx - \mu^2$
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

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