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Student Name: _____

Student Name: _____

Question/Answer Booklet - Section 1 - Calculators NOT allowed - Notes sheets NOT allowed

3CD MATHEMATICS

Methodist Ladies' College Semester 2, 2010

Time allowed for this paper

Teacher's Name: _____

Section	Reading	Working	Calculator-free	Calculator-assumed
Section One Question/Answer Booklet	40 marks		To be provided by the candidate	
Section Two Question/Answer Booklet	80 marks			To be provided by the supervisor

MATERIALS REQUIRED/RECOMMENDED FOR THIS PAPER

Section Two (Calculator-assumed): 80 marks

Section One (Calculator-free): 40 marks

Standard items: pens, pencils, pencil sharpener, eraser, correction fluid, ruler, highlighters

Special items: drawing instruments, templates, notes on two unruled sheets of A4 paper, Council for this course.

Important Note to Candidates
No other items may be taken into the examination room. It is your responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor before reading any further.

Instructions to candidates

- All questions should be attempted.
- Write your answers in the spaces provided in this Question/Answer Booklet. Spare answer pages may be found at the end of this booklet. If you need to use them, indicate in the original answer space where the answer is continued (i.e. give the page number).
- Show all your working clearly.** Your working should be in sufficient detail to allow your answers to be checked readily and for marks to be awarded for reasoning. Incorrect answers given without supporting reasoning cannot be allocated any marks. For any question or part question worth more than two marks, valid working or justification is required. If you repeat an answer to any question, ensure that you cancel the answer you do not wish to have marked.
- It is recommended that you **do not use** pencil except in diagrams.

Structure of this paper

Questions	Marks available	Your score
1	5	
2	5	
3	4	
4	4	
5	2	
6	4	
7	7	
8	4	
9	5	
Total:	40	
10	5	
11	3	
12	5	
13	8	
14	10	
15	7	
16	8	
17	6	
18	7	
19	5	
20	7	
21	6	
22	3	
Total:	80	
Total marks = 120		%

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Additional working space

Question number(s): _____



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(5 marks)

Solve

$$\frac{x^2+13x+15}{2x^2+13x+15} \geq \frac{x-9}{x+3}$$

Question 1

Suggested working time for this section is 50 minutes.

This section has nine (9) questions. Answer all questions. Write your answers in the space provided.

Section One: Calculator-free
(40 Marks)

Additional working space
Question number(s): _____

SEMESTER TWO EXAMINATION
SECTION ONE
MATHEMATICS 3C/3D
CALCULATOR-FREE

SEMESTER TWO EXAMINATION
SECTION ONE
CALCULATOR-FREE

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MATHEMATICS 3C/3D

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Question 2

Find the following:

(a) $\int x^2 \sqrt{x^3 + 5} dx$

(5 marks)

[2]

(b) $\int_0^3 e^{-4x} dx$

[2]

(c) $\frac{d}{dx} \int_3^x \frac{8t}{\sqrt{t+9}} dt$

[1]

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Additional working space

Question number(s): _____





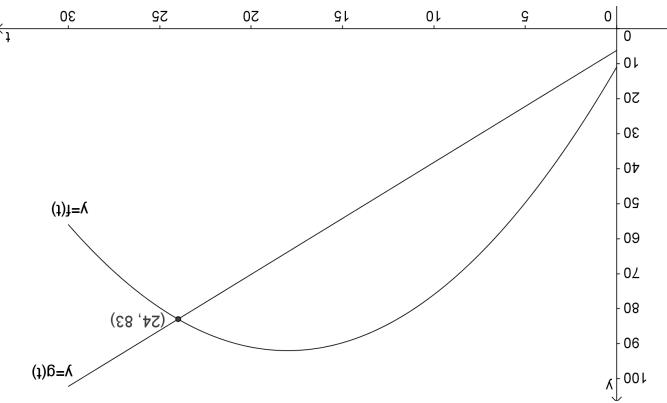
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- (c) Write down an expression for the volume of the solid generated when the part of the curve $y=f(t)$ between $t=5$ and $t=25$ is rotated about the horizontal axis. [1]

- (d) If $f(t)$ represents the marginal revenue (in hundreds of dollars) for a product, where t is measured in months and $g(t)$ represents the marginal cost (also in hundreds of dollars) for the product, what does this enclosed area represent? [2]

- (a) Write down an expression for the area enclosed by the two graphs and the vertical axis. [1]



The graphs of $f(t) = -0.25t^2 + 9t + 11$ and $g(t) = 3.2t + 6.2$ are shown on the axes below.

Question 3
(4 marks)

MATHEMATICS 3C/3D
CALCULATOR-FREE
SECTION ONE
SEMESTER TWO EXAMINATION
5

CALCULATOR-FREE
SECTION ONE
SEMESTER TWO EXAMINATION
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Additional working space
Question number(s): _____

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Question 4

(4 marks)

In a probability experiment, events A and B are such that

$$P(A) = \frac{1}{4}, \quad P(B|A) = \frac{1}{3} \quad \text{and} \quad P(\overline{A} \cap \overline{B}) = \frac{1}{4}.$$

Find

(a) $P(A \cup B)$

[2]

(b) $P(B)$

[2]

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Question 9

(5 marks)

Determine the equation of the line tangential to the curve $f(x) = \frac{9-x^2}{x}$ at the point where $x=1$.

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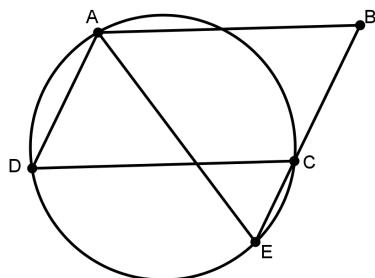
- Question 8 (2 marks)
- Given $f(x) = \sqrt{x+2}$, $g(x) = \frac{x+5}{1-x}$, and $k(x) = \frac{x}{x-5}$, determine:
 Which of the following statements is true for two events, each with probability greater than 0? Justify your answer.
- (a) $g \circ f(1)$ [2]
 (b) the domain and range of $k \circ f$ [2]
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- Question 5 (4 marks)
- DO NOT WRITE IN THIS AREA
- A: If the events are mutually exclusive, they must be independent.
 B: If the events are independent, they must be mutually exclusive.
 C: If the events are not mutually exclusive, they must be independent.
 D: If the events are not independent, they must be mutually exclusive.
 E: If the events are mutually exclusive, they cannot be independent.
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(4 marks)

Question 6

In the diagram below, ABCD is a parallelogram.



Prove that $\triangle ABE$ is isosceles.

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Question 7

Consider the following system of equations:

$$\begin{aligned}3x - 2y + z &= -7 \\-x + 2y + 2z &= 11 \\ax + bz &= 4\end{aligned}$$

- (a) Determine the value of a and of b such that the system of equations has an infinite number of solutions. [2]

- (b) Solve the system when $a = -2$ and $b = 1$. [5]

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