WESLEY COLLEGE
SOUTH PERTH

Semester Two Examination 2010

Question/Answer Booklet

MATHEMATICS
3C/3D

Section One:
Calculator-free

Student Name: _____

Time allowed for this section
Reading time before commencing work: Five (5) minutes
Working time for this section: Fifty (50) minutes

Material required/recommended for this section
To be provided by the supervisor
This Question/Answer Booklet
Formula Sheet

To be provided by the candidate
Standard items: pens, pencils, pencil sharpener, eraser, correction fluid, ruler, highlighters

Special items: nil

Important note to candidates
No other items may be used in this section of the examination. 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.

Structure of this paper

Section	Number of questions available	Number of questions to be answered	Working time (minutes)	Marks available	Percentage of exam
Section One: Calculator-free	8	8	50	40	33 1/3
Section Two: Calculator-assumed	13	13	100	80	66 2/3
				120	100

Instructions to candidates

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2010*. Sitting this examination implies that you agree to abide by these rules.

2. Write your answers in the spaces provided in this Question/Answer Booklet. Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.
   - Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
   - Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

3. **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 to receive full marks. If you repeat an answer to any question, ensure that you cancel the answer you do not wish to have marked.

4. It is recommended that you **do not use pencil** except in diagrams.

Section One: Calculator-free **(40 Marks)**

This section has **eight (8)** questions. Answer **all** questions. Write your answers in the space provided.

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

- Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
- Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

Suggested working time for this section is 50 minutes.

Question 1 **(6 marks)**

For the functions $f(x) = e^{x-2}$ and $g(x) = \frac{1}{\sqrt{x}}$, determine

(a) $g \circ f(0)$, as a simplified exact value (2 marks)

(b) the domain of $g(x)$ (1 mark)

(c) $f(g(x))$ (1 mark)

(d) the range of $f(g(x))$ (2 marks)

See next page

Question 2 **(6 marks)**

Differentiate the following:

(a) $y = e^{\sqrt{x}}$ (2 marks)

(b) $f(x) = \int_3^{x^2} \sqrt{5-2t}\, dt$ (1 mark)

(c) $g(x) = x.e^x$ (1 mark)

From your result for $g'(x)$ in part (c):

(d) find $\int x.e^x\, dx$ (2 marks)

See next page

Question 3 **(5 marks)**

A standard normal score of 1.28 is such that $P(0 < z < 1.28) = 0.4$
Use this information to determine:

(a) $P(0 < z < 1.28 \mid z < 1.28)$ (2 marks)

(b) an 80% confidence interval for an observation from a normal population with mean 50 and standard deviation 10. (1 mark)

(c) an 80% confidence interval for the mean of any sample of size 64 taken from any population of mean 50 and standard deviation 10. (2 marks)

See next page

Question 4 **(4 marks)**

Determine the following integrals:

(a) $\int \left(e^{3x} - e^{-3x}\right)^2 \, dx$ (2 marks)

(b) $\int x\sqrt{4 - x^2} \, dx$ (2 marks)

Question 5 **(5 marks)**

Identify all the values of x for which $2-\frac{x}{2} \geq \frac{5}{x+3}$

Question 6 **(6 marks)**

(a) A tangent is drawn to the curve $y = \sqrt{x}$ at the point $(4, 2)$ (2 marks)
What is the equation of this tangent?

(b) Calculate the area enclosed by this tangent, the curve $y = \sqrt{x}$ and the *y*-axis. (3 marks)

(c) Write down the integral, or integrals, that you would use to calculate the volume of the solid of revolution formed when the area in part (b) is revolved through 360° around the *x*-axis. (1 mark)

See next page

Question 7 **(3 marks)**

Solve the system of equations $\begin{cases} x+3y+z=6 \\ x-y-z=0 \\ 2x+6y+z=7 \end{cases}$

See next page

Question 8 **(5 marks)**

A function $f(x)$ is defined by $f(x)=\dfrac{ax+1}{x+b}$ for constants *a* and *b*.

(a) Write an expression for $f'(x)$ in terms of *a* and *b* and undertake any obvious simplifications. (2 marks)

(b) Verify that $a=3$ and $b=1$ lead to the result $f(1)=f'(0)=2$. (1 mark)

(c) Give two general observations about the slope of $y=f(x)$ when $a=3$ and $b=1$. (2 marks)

Additional working space

Question number(s): _____

DO NOT WRITE IN THIS AREA