

**PERTH COLLEGE**

**Year 12**

**Semester One Examination 2012**

**Question/Answer booklet**

**MATHEMATICS SPECIALIST**

**3C/3D**

**Section One:**

**Calculator – free**

|  |
| --- |
| Student Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**Time allowed for this section**

Reading time before commencing work: 5 minutes

Working time for paper: 50 minutes

**Material required/recommended for this section**

**To be provided by the supervisor**

Question/answer booklet for Section One

Formula sheet

***To be provided by the candidate***

*Standard items: pens, pencils, pencil sharpener, highlighter, eraser, ruler*

*Special items: nil*

**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.

**Structure of this paper**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Number of questions available | Number of questions to be attempted | Working  Time  (minutes) | Marks available |
| **Section One**  **Calculator-free** | **5** | **5** | **50 minutes** | **50** |
| Section Two  Calculator-assumed | 12 | 12 | 100 minutes | 100 |
| **Total marks** | | | | 150 |

**Instructions to candidates**

1. 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
   1. Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
   2. 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.
2. **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 answers you do not wish to have marked.
3. It is recommended that you **do not use pencil,** except in diagrams

Question 1 [7 marks]

Consider the functions .

Let .

a) Write  as a piecewise function free of absolute values.

[5]

b) Determine the range of 

[2]

**Question 2 [14 marks]**

a) Determine  for each of the following. Only minor simplification is required.

(i) 

[3]

(ii) 

[3]

(iii) 

[4]

b) Determine the exact value of .

[4]

**Question 3 [15 marks]**

Consider matrix **T** = 

a) In each case, state the value of *k* which satisfies the given condition.

(i) **T** is singular.

[2]

(ii) **T** maps the vertices of a quadrilateral onto a line.

[1]

(iii) **T** maps the triangle with vertices P (0, 0), Q (1, 0), R (0, –1) onto the triangle with vertices P’ (0,0) , Q’ (4, –5) and R’ (–2, –3).

[2]

(iv) **T**2 = 

[2]

(v) **T** – 2**I** =  , where **I** is the 2 × 2 Identity Matrix.

[1]

(vi) The point (3, 4) is transformed to the point (4, –7) after applying , and then applying **T**.

[3]

b) If *k* = 2 and **A** =  , find **B**, given that **AB** + **B** = **T**.

[4]

**Question 4 [7 marks]**

Determine each of the following indefinite integrals:

a) 

[2]

b) 

[2]

c) 

[3]

**Question 5 [7 marks]**

A curve is defined parametrically by the equations  and .

Find each of the following in terms of , fully simplifying your answers.

a) 

[3]

b) 

[4]

**EXTRA PAGES FOR WORKING**

**Clearly number any questions you do here.**

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**Clearly number any questions you do here.**

Your Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
|  | Question | Marks Available | Your Mark |
|  | 1 | 7 |  |
|  | 2 | 14 |  |
|  | 3 | 15 |  |
|  | 4 | 7 |  |
|  | 5 | 7 |  |
|  | TOTAL  SECTION 1 | 50 |  |
|  | TOTAL SECTION 2 | 100 |  |
|  | OVERALL | 150 |  |