# Rossmoyne Senior High School

### Semester One Examination, 2015

### Question/Answer Booklet

**SOLUTIONS**

# MATHEMATICS 3C

## Section One:

## Calculator-free

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Student Number: In figures |  |  |  |  |  |  |  |  |

In words

Your name

## Time allowed for this section

Reading time before commencing work: five minutes

Working time for this section: fifty minutes

## Materials 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 (blue/black preferred), pencils (including coloured), sharpener,

correction fluid/tape, eraser, ruler, highlighters

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Section | Number of questions available | Number of questions to be answered | Working time (minutes) | Marks available | Percentage of exam |
| Section One:  Calculator-free | 7 | 7 | 50 | 50 | 33⅓ |
| Section Two:  Calculator-assumed | 12 | 12 | 100 | 100 | 66⅔ |
|  | | | **Total** | 150 | 100 |

## Instructions to candidates

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2015*. Sitting this examination implies that you agree to abide by these rules.
2. Write your answers in this Question/Answer Booklet.
3. You must be careful to confine your response to the specific question asked and to follow any instructions that are specified to a particular question.
4. 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 that you are continuing to answer at the top of the page.

1. **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 any question, ensure that you cancel the answer you do not wish to have marked.
2. It is recommended that you **do not use pencil**, except in diagrams.
3. The Formula Sheet is **not** to be handed in with your Question/Answer Booklet.

Section One: Calculator-free (50 Marks)

This section has**seven (****7)** questions. Answer **all** questions. Write your answers in the spaces provided.

Working time: 50 minutes.

Question 1 (5 marks)

Determine the area of the region enclosed between the line  and the curve .



Question 2 (8 marks)

Determine the following, simplifying where possible.

(a) . (2 marks)



(b) . (2 marks)



(c) . (2 marks)



(d) . (2 marks)



Question 3 (8 marks)

Two functions are defined as  and .

(a) State  with its domain and range. (3 marks)



(b) Determine the domain and range of . (2 marks)



(c) Determine  if . (3 marks)



Question 4 (10 marks)

A function is given by .

(a) Determine the coordinates of the axes intercepts of the graph of . (2 marks)



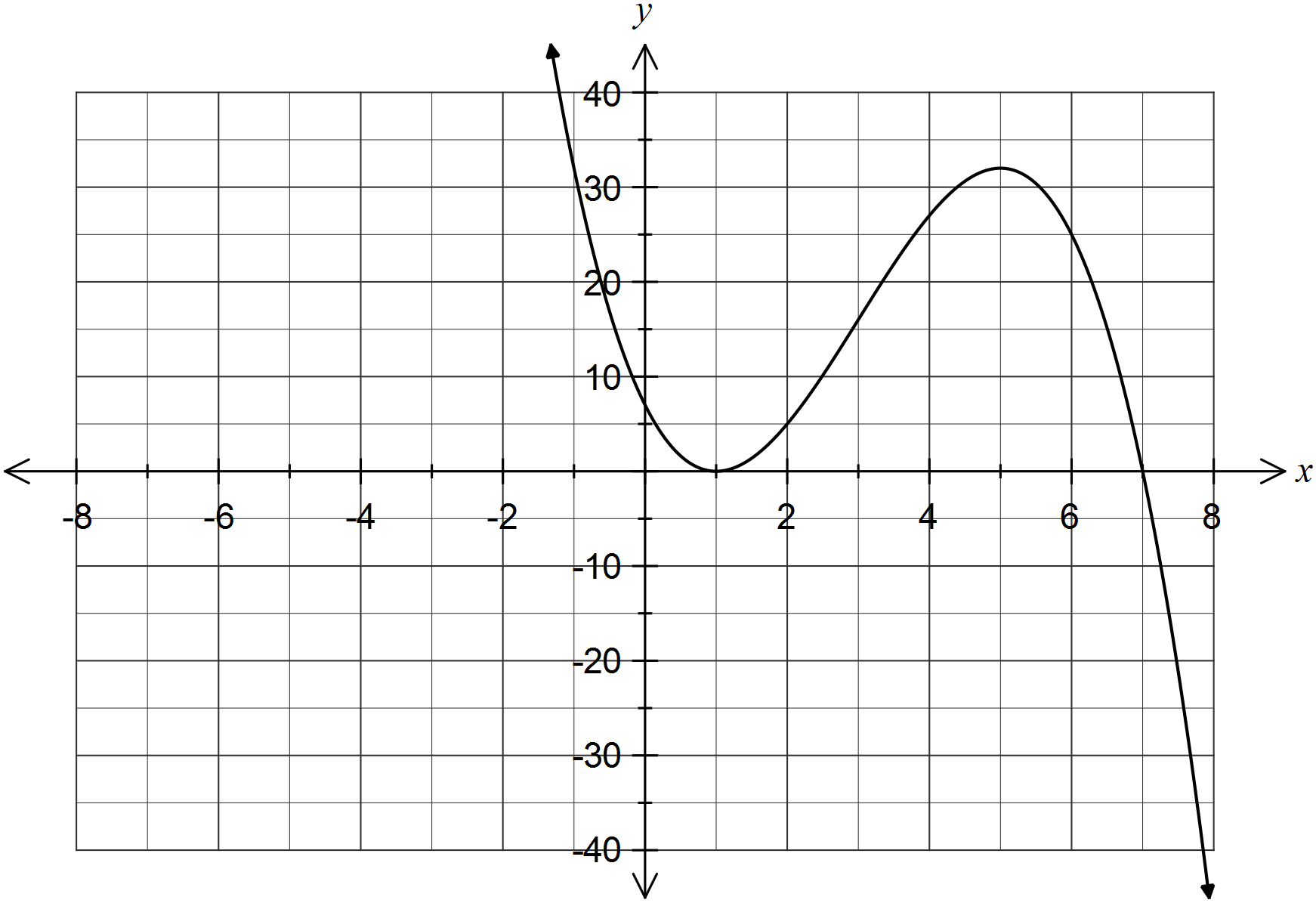
(b) Determine the coordinates of the stationary points of the graph of . (4 marks)



(c) Determine the location of the point of inflection of the graph of . (2 marks)



(d) Sketch the graph of  on the axes below. (2 marks)



Question 5 (8 marks)

(a) Show that . (3 marks)



(b) Show that the curve  has a root at (3, 0). (1 mark)

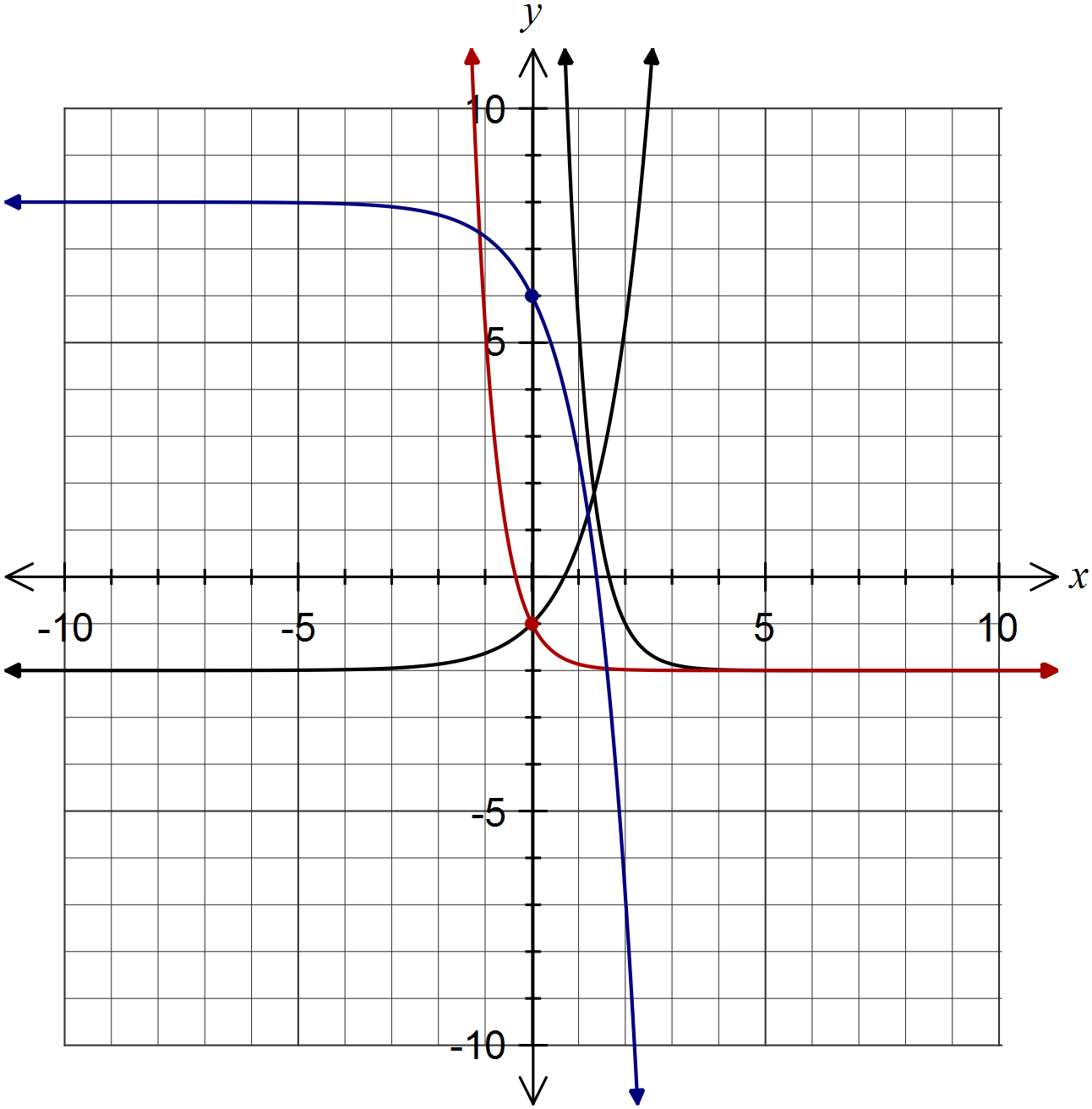


(c) The equation of the tangent to the curve  at the point (3, 0) is . Determine the values of  and . (4 marks)



Question 6 (8 marks)

The graph of the functions  and  are shown below.



(a) Determine the value of the constant . (3 marks)



(b) On the same axes, sketch the graphs of

(i) . (2 marks)

(ii) . (3 marks)

Question 7 (3 marks)

The derivatives of the sequence 

are .

When  is a positive even integer, the sum of the series .

Show that when  is a positive even integer, the sum of the series of derivatives .

If sum of series is , then sum of series of derivatives will be .



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