

A formula sheet which may also be used for Section Two.
Question/answer booklet for Section One.

To be provided by the supervisor

No other items may be taken into the examination room. If you 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.
that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. It is your responsibility to ensure

IMPORTANT NOTE TO CANDIDATES

Standard items: pens, pencils, pencil sharpener, highlighter, eraser, ruler.
To be provided by the candidate

MATERIAL REQUIRED / RECOMMENDED FOR THIS SECTION

Working time for section: 50 minutes
Reading time before commencing work: 5 minutes

TIME ALLOWED FOR THIS SECTION

Teacher:

Name:

Section One
(Calculator-free)

2016

REVISION 2
Units 3-4

MATHEMATICS METHODS

| | | | |
|-----------------------|--------------------------|-------------------------|-----------------|
| SEMINESTER TWO | Papers written by | Australian Maths | Software |
|-----------------------|--------------------------|-------------------------|-----------------|

YEAR 12

END OF SECTION ONE

Calculator-free

Calculator-free

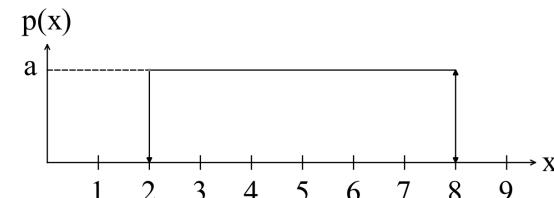
Structure of this examination

| | Number of questions available | Number of questions to be answered | Working time (minutes) | Marks available | Percentage of exam |
|------------------------------------|-------------------------------|------------------------------------|------------------------|-----------------|--------------------|
| Section One Calculator-free | 5 | 5 | 50 | 50 | 35 |
| Section Two Calculator—assumed | 13 | 13 | 100 | 100 | 65 |
| Total marks | | 150 | 100 | | |

Instructions to candidates

1. The rules for the conduct of this examination are detailed in the Information Handbook. Sitting this examination implies that you agree to abide by these rules.
2. Write your answers in the Question/Answer booklet.
3. You must be careful to confine your responses to the specific questions asked and to follow any instructions that are specific to a particular question.
4. Spare pages are provided 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.
5. 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.
6. It is recommended that you **do not use pencil**, except in diagrams.
7. The Formula Sheet is **not** to be handed in with your Question/Answer booklet.

- (c) A continuous uniform probability density function is graphed below



- (i) Find the value of a . (1)

- (ii) Determine $P(3 \leq x \leq 5)$. (1)

- (iii) Determine $P(x \leq 3 | x \leq 7)$. (2)

- (iv) Define the cumulative probability density function. (3)

(2)

$$\frac{\cos(x)}{\sin(x)} = h(x) \quad (\text{iii})$$

(2)

$$(x - 1)(x + 1)^n = (x)^5 \quad (\text{ii})$$

(2)

- (a) Find the derivative of $f(x) = e^x \tan(x)$

1. (6 marks)

(3)

probability density function on the domain $1 \leq x \leq 3$.

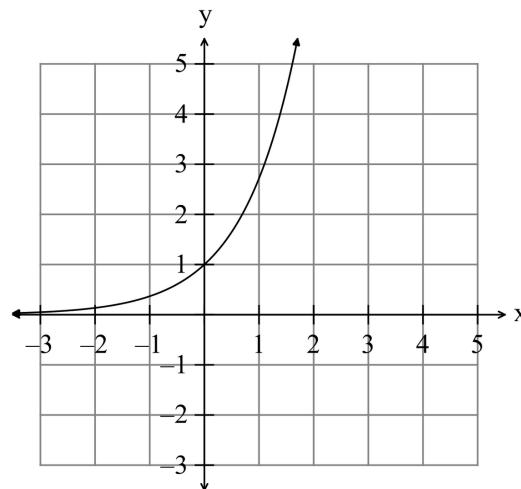
- (b) (i) Prove that the function $f(x) = \begin{cases} |x - 2| & \text{for } 1 \leq x \leq 3 \\ 0 & \text{otherwise} \end{cases}$ defines a continuous

(iii) Hence find $P(2.5 \leq x \leq 3)$.

(2)

2. (16 marks)

- (a) The graph of $f(x) = e^x$ is shown on the set of axes below.



Sketch the following functions on the same set of axes and label each graph.

(i) $g(x) = -e^{-x}$

(2)

(ii) $y = -f^{-1}(x)$, where f^{-1} is the inverse of f .

(2)

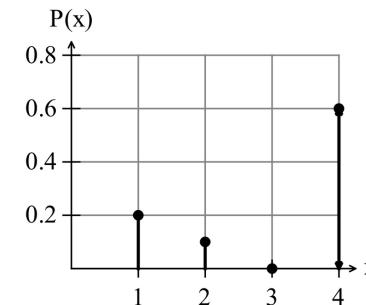
(iii) $y = 1 + 2f^{-1}(x)$

(3)

5. (14 marks)

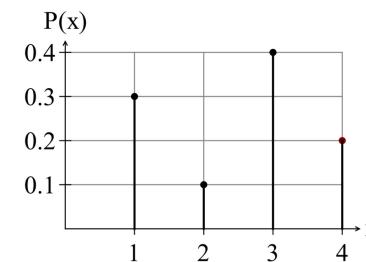
- (a) Which of the following do not represent probability density functions?
State clearly why.

(i)



(1)

(ii)



(1)

(e)

$$\frac{-\log_2 36}{(\log_2 3 + \log_2 2)}$$

(c) Simplify

(2)

$$\frac{\partial}{\partial z} x = 0$$

(ii)

(2)

- (i) Given $\log_x (36) = 2$
- (ii) Find x given

Evaluate the following

$$(a) \int_3^x -2x + \sqrt{x} dx$$

4. (7 marks)

(2)

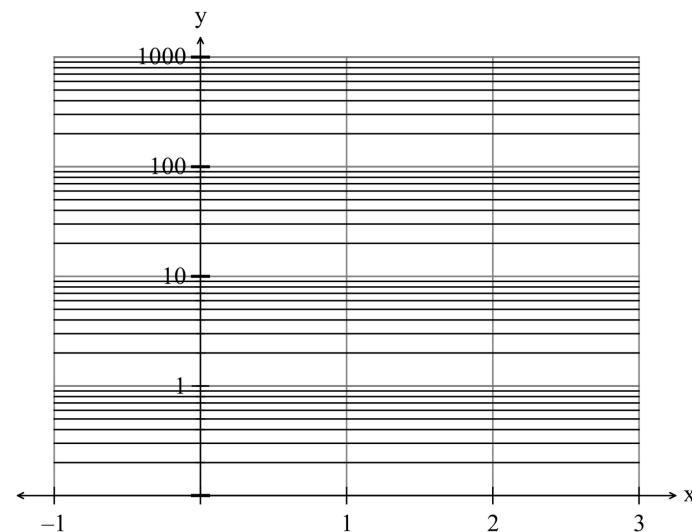
$$(b) \int \frac{1-4x}{x^2} dx$$

(3)

$$(c) \int_{\pi/2}^{\pi} (\sin(2x) + \cos(2x)) dx$$

(d) Sketch $y = 10^x$ on the following semi-log paper.

(2)



(b) (i) Find the derivative of $\ln(x-2)$

(2)

(ii) hence determine $\int \frac{2}{(x-2)} dx$ for $x > 2$

(2)

3. (7 marks)

(a) Sketch a function that has the following properties

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

(3)