

Semester One Examination, 2022

Question/Answer booklet

MATHEMATICS METHODS UNIT 3

Section One: Calculator-free

Your Name:	
Your Teacher's Name:	

Time allowed for this sectionReading time before commencing work:
Working time:

five minutes
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 material. If you have any unauthorised material with you,
hand it to the supervisor before reading any further.

Question	Marks	Max	Question	Marks	Max
1		8	5		6
2		10	6		13
3		8			
4		8			

CALCULATOR-FREE 2 MATHEMATICS METHODS

Structure of this paper

Section	Number of questions available	Number of questions to be answered	Working time (minutes)	Marks available	Percentage of examination
Section One: Calculator-free	6	6	50	53	35
Section Two: Calculator- assumed	10	10	100	100	65
				Total	100

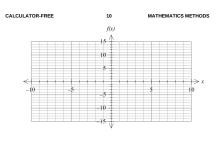
Instructions to candidates

- The rules for the conduct of the Western Australian Certificate of Education ATAR course examinations are detailed in the Year 12 Information Handbook 2019. Sitting this examination implies that you agree to abide by these rules.
- Write your answers in this Question/Answer booklet.
- You must be careful to confine your answers to the specific questions asked and to follow any instructions that are specific to a particular question.
- Additional pages for the use of planning your answer to a question or continuing your answer to a question have been provided at the end of this Question/Answer booklet. If you use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number.
- 5. Show all your vorting clearly. Your vorting should be it sufficient cetal to allow your showers be exhected resident and for make to be exhected resident and for make to be exhected for resourcing locations and the property of the p
- 6. It is recommended that you do not use pencil, except in diagrams.
- The Formula sheet is not to be handed in with your Question/Answer booklet.

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CALCULATOR-FREE	11	MATHEMATICS METHODS
Additional working space		

Question number: _____



Additional working space

Question number: _____

CALCULATOR-FREE MATHEMATICS METHODS Section One: Calculator-free (53 marks)

This section has six questions. Answer all questions. Write your answers in the spaces

- 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.

Working time: 50 minutes.

Question 1 (8 marks)

The function f is defined for x>0 by $f|x|=\frac{e^{4x-1}}{x}$, and $f^-(x)=\frac{2\left[8\,x^2-4\,x+1\right]e^{4x-1}}{x^2}$.

a) Show that
$$f'(x) = \frac{e^{4x-1}(4x-1)}{x^2}$$
 (2 marks)

b) Determine the coordinates and nature of all stationary points of y = f(x). Justify your

c) Show that y = f(x) has no points of inflection. (2 marks)

> MATHEMATICS METHODS CALCULATOR-FREE MATHEMATICS METHODS

b) Hence, evaluate the following in exact form: $\int\limits_0^--\sin 4x\cos^2(4x)\,dx$

a) Determine $\frac{a}{dx}(\cos^3|4x|)$

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b) Using your answer from part b), show how to calculate the following without the use of a calculator. Do not evaluate your answer.

(3 warks) In the standard deviation when p=0.25 is 6. Determine the value of n.

a) The student notes that one of the distributions produced a graph that is skewed to the right (long tail to the right). Which of the values of p were used to produce this graph? Give justification for your choice.

A student observes the graphs of three binomial distributions with the assigned random variables A, B and C for each graph. For all three distributions, the value of n is constant, but the values of $_{\rm p}$ are 0.5, 0.5, and 0.9 respectively. (8 marks)

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(4 wsrks)

(swew z)

(e warks)

(S warks) d) Determine the exact values of f[-1]. (2 marks) b) Determine the intervals where f(x) is concave up and concave down, respectively. (a) Determine the value of k (2 marks) a) Determine the intervals where f(x) is increasing and decreasing, respectively. (2 marks) $xb = -x \le \sqrt{\sum_{z=0}^{z} \text{ eleulev}}$ (d) Given that $f(x) = \int_{-\tau} g(t) dt$, where $-7 \le x \le 8$. (3 marks) e) Determine the exact values f(8). (2 marks) Determine: (b) (i) $P(X<4\lor X>1)$ (2 marks) (ii) E(X) (2 marks) $.77.01 > xb \cdot 1 - x \cdot 2 / \int_{0.00}^{1} > 7.2.3$ why to explain why $0.27 \cdot 1 \cdot 2 \times 1.04 \times 1.04 \times 1.04$ f) Sketch the graph of f(x) in the axes provided below, for $-7 \le x \le 8$. Label key features. (a) Use the areas of the S S'# # S'E E S'Z Z S'T T S'O (c) A second discrete random variable Y is defined to be Y=aX+b. If E(Y)=2 and the standard deviation of Y is $\sqrt{14}$, determine a and b. (4 marks) The graph of $\mathfrak{g}[x]$ is given as below, which consists of a semi-circle for $-7 \le x \le -1$ and a triangle for $-1 \le x \le 8$. Approximate values for $\overline{\delta}$ and $\overline{\delta}$ and $\overline{\delta}$ are 1.73 and 2.45 respectively. (13 marks) . The remarks of z = x and z = x and z = xThe graph of $y = \sqrt{2x-1}$ between (8 marks) Question 3 MATHEMATICS METHODS MATHEMATICS METHODS CALCULATOR-FREE CALCULATOR-FREE See next page See next page

(S warks)

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CALCULATOR-FREE

The discrete random variable X has a probability function with $Var(X) = \frac{14}{9}$

 $P(X = x) = \begin{cases} \frac{x}{k}, & x = 1, 2, 3, 4, 5 \end{cases}$

Question 2

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(10 marks)

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(c) Evaluate $\int_{0.2}^{c} \left| \sqrt{\sum_{x=1}^{c} x - 1} - 3 \right| dx.$

See next page

c) Determine the value(s) of x when I|x (seaches any stationary point(s) and the nature of the stationary point(s). If any,