TSSM™
Creating VCE Success

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'2016 Examination Package' -
Trial Examination 5 of 5

STUDENT NUMBER

									Letter
Figures									
Words									

MATHEMATICAL METHODS

Units 3 & 4 – Written examination 1

(*TSSM's *2015 trial exam updated for the current study design)

Reading time: 15 minutes
Writing time: 1 hour

QUESTION & ANSWER BOOK

Structure of book

Number of questions	*Number of questions to be answered*	*Number of marks*
8	8	40
		Total 40

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners and rulers.
- Students are NOT permitted to bring into the examination room: notes of any kind, blank sheets of paper, white out liquid/tape or a calculator of any type.

Materials supplied

- Question and answer book of 9 pages.
- Working space is provided throughout the book.

Instructions

- Print your name in the space provided on the top of this page.
- All written responses must be in English.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic communication devices into the examination room.

Instructions

Answer **all** questions in the spaces provided.
A decimal approximation will not be accepted if an exact answer is required to a question.
In questions where more than one mark is available, appropriate working must be shown.
Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Question 1 (4 marks)

Let $f(x) = \sqrt{3 - 5x}$

a. Find the domain of $f(x)$.

1 mark

b. Find the derivative of $f(x)$ with respect to x.

2 marks

c. Find the exact value of $f'\left(\frac{1}{5}\right)$.

1 mark

Question 2 (6 marks)
Consider $f(x) = \sin(3x)$

a. Evaluate $F(x) = \int f(x)dx$ given that $F(0) = 0$.

3 marks

b. Hence, solve the equation $F(x) = \frac{1}{2}$ over $[0, \pi]$.

3 marks

TURN OVER

Question 3 (9 marks)

Consider the function with rule $f(x) = \frac{x-2}{x+2}$

a. Find the rule, f^{-1}, for the inverse of f.

3 marks

b. Find the domain and range of the inverse of f.

2 marks

c. Show that $f^{-1}(x)$ can be written in the form $a + \frac{b}{1-x}$ and hence find $\int_0^{\frac{1}{2}} f^{-1}(x)\, dx$.

4 marks

Question 4 (8 marks)

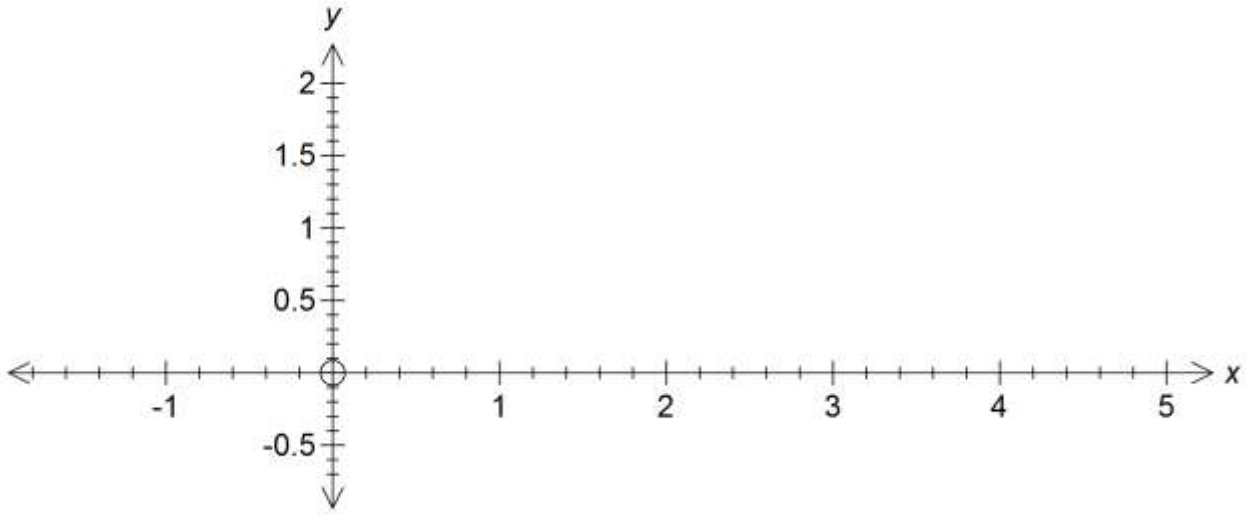
The function $f(x)$ is defined as $f: [0, 3] \to R,\ f(x) = \frac{1}{4}x^4 - x^3 + x^2$

a. Find the stationary points of $f(x)$.

3 marks

TURN OVER

b. Sketch the graph of $f(x)$ on the axes below. Label the end-points, stationary points and axes intercepts.



3 marks

c. Find the area bounded by the graph of $y = f(x)$ between $x = 0$ and $x = 2$ and the x-axis.

2 marks

Question 5 (5 marks)
Solve the following equations.

a. $\frac{4000}{2+7^{3x}} = 5$

2 marks

b. $2 \times 4^x + 2^x - 1 = 0$.

3 marks

TURN OVER

Question 6 (4 marks)

The discrete random variable X has the following distribution table.

X	0	1	2	3
$Pr(X)$	$\frac{1}{5}$	$\frac{1}{3}$	$\frac{1}{10}$	k

a. Show that $k = \frac{11}{30}$.

1 mark

b. Find $\Pr(X < 2)$.

1 mark

c. Find the mean of the distribution.

2 marks

Question 7 (2 marks)

The tangent to the curve $y = \frac{3}{x} - 2$ at the point $x = a$, where $a > 0$, has a gradient of -9. Find the value of a.

2 marks

Question 8 (2 marks)

A sample of ***r*** people were asked if strawberry was their favourite ice cream flavour, 90% replied yes.

a. What is the value of the sample proportion $\hat{p}$?

1 mark

b. If the number of people in the sample were doubled, what would be the effect on the margin of error M **?**

1 mark

Total 2 marks

END OF QUESTION AND ANSWER BOOK