

Student Name: _____

MATHEMATICAL METHODS (CAS)

Unit 2 – Written examination 1



2007 Trial Examination

Reading Time: 15 minutes

Writing Time: 1 hour

QUESTION AND ANSWER BOOK

Structure of Book

<i>Number of questions</i>	<i>Number of questions to be answered</i>	<i>Number of marks</i>
10	10	40

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, 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 8 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 devices into the examination room.

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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

A hiker starts from their campsite (O) and travels $\sqrt{3}$ km on a bearing of $N 30^\circ E$ (A). He then walks due North a further 2 km (B).

- a. Construct a diagram of the hiker's path.

2 marks

- b. How far from the campsite is the hiker when he reaches B ?

2 marks

The hiker backtracks to point A , then travels due West until they are due North from the campsite.

- c. How far did he have to walk from B to get to this point?

2 marks

TURN OVER

Question 2

For the angle θ , it has been found that $\tan \theta = \frac{4}{3}$, where $0 < \theta < \frac{\pi}{2}$

- a. find $\sin \theta$.

2 marks

- b. find $\cos \theta$.

2 marks

Question 3

- a. On the axes below, construct the graph of $y = 2 \sin 2x$, for $0 \leq x \leq 2\pi$.



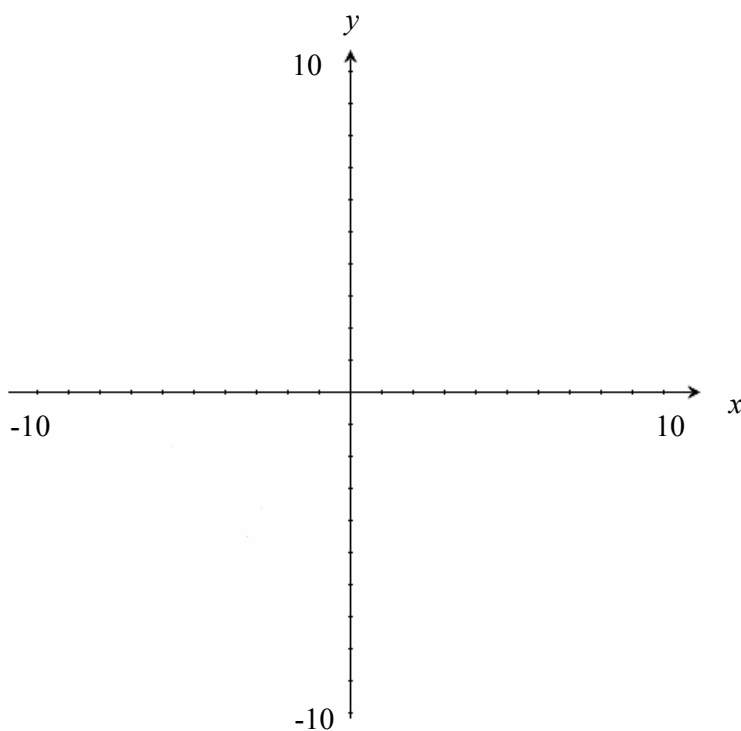
- b. What is the range of the equation?

1 mark

3 marks

Question 4

Consider the function $y = \frac{2^x}{4}$. Using the axes provided, graph the function over the specified domain $x \in [0, 5]$, labelling any intercepts. Space has been left for you to work out values of x and y .

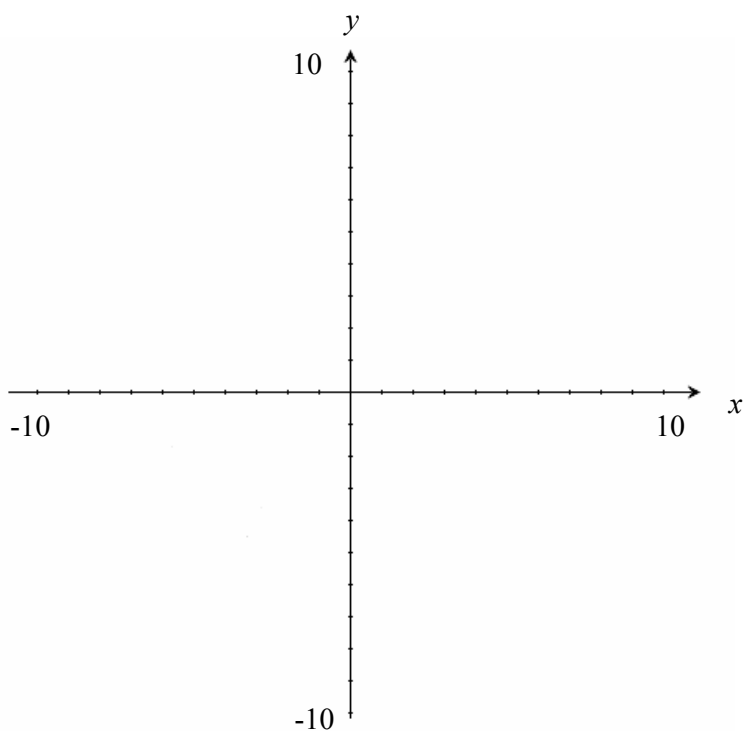


4 marks

TURN OVER

Question 5

Consider the function $y = 2\log_2 x$. Using the axes provided, graph the function over the specified domain $x \in [1, 8]$, labelling any intercepts. Space has been left for you to work out values of x and y .



4 marks

Question 6

Let $f(x) = 3\sqrt{3}x^3 + 2x - \frac{5}{2} + 3x^{-1}$. Determine the gradient function of $f(x)$.

2 marks

Question 7

The volume of a sphere is given by $V = \frac{4}{3}\pi r^3$.

a. Calculate $V'(r)$.

2 marks

b. Find an expression involving π for the rate of change of the volume (in cm^3/cm) when the radius is 2.5 cm.

2 marks

Question 8

Determine the location and nature of any turning points for the equation $f(x) = 3x^2 - 2x + 7$

5 marks

TURN OVER

Question 9

Let $f'(x) = 2x^3 - x^2 - \frac{1}{2}x + 3$. Determine the original function $f(x)$, if $f(-1) = \frac{1}{12}$.

4 marks

Question 10

A committee needs to elect 5 members out of 5 males and 3 females. Showing your working, determine the probability that exactly 3 of the members will be male.

3 marks

END OF QUESTION AND ANSWER BOOK