EXAM PAPER

# Mathematical Methods Unit 3 & 4 — Examination 1 (Practice 4)

**PREVIEW**
This file has the first 5 of the 9 questions in this paper. The rest is locked: it comes with a PrepNest plan, or with the paper itself for VCE.

Reading time: 15 minutes (no writing)
Writing time: 60 minutes
**Total time: 75 minutes**

## SECTIONS IN THIS PAPER

- Examination 1 — technology-free — 60 min (no calculator)

### INSTRUCTIONS

You are not permitted to write during reading time — you may only read the paper and plan your approach. Answer every question you can. Write your working in the space provided for long-answer questions. Marking guidance and full explanations are provided in the separate answer key.

# Examination 1 — technology-free

60 minutes • No calculator

Question 1 (4 marks)

This question is about the chain and product rules.

a. Let $y = (3x - 1)^4$. Find $dy/dx$. 1 mark

b. Let $f(x) = x^2\log_e(x)$, where $x > 0$. Evaluate $f'(e)$. 2 marks

c. Let g(x) = e^(sin(x)). Evaluate $g'(\pi)$. 1 mark

Question 2 (3 marks)

This question is about antiderivatives of exponential, reciprocal and power functions.

a. Find $\int(4e^{2x} - 3/x)\,dx$, where $x > 0$. 2 marks

b. Given that $f'(x) = 3\sqrt{x}$ and $f(4) = 20$, find $f(x)$. 1 mark

Question 3 (5 marks)

Let $f: R \setminus \{-1\} \to R$, $f(x) = 2 - 3/(x + 1)$.

a. Write down the equations of the asymptotes of the graph of f. 1 mark

b. Find the coordinates of the points where the graph of f meets the axes. 2 marks

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c. Find the rule and domain of the inverse function $f^{-1}$. 2 marks

Question 4

(4 marks)

Let f: [0, 2π] → R, f(x) = 1 − 2cos(x).

a. State the range of f. 1 mark

b. Solve f(x) = 2 for x. 2 marks

c. State the x-intercepts of the graph of f. 1 mark

Question 5

(5 marks)

A game costs $2 to play. The player rolls a fair six-sided die and wins $5 for a six, $2 for a four or a five, and nothing otherwise. Let X be the player's net gain, in dollars, from one game.

a. Write down the probability distribution of X. 1 mark

b. Find E(X). 1 mark

c. Find Var(X). 2 marks

d. The game is played twice. Find the probability that the player's total net gain is positive. 1 mark

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6.

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**9.**

4 questions locked, up to question 9.

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PREVIEW

# That’s the end of the preview

You’ve seen the first 5 of the 9 questions in Mathematical Methods Unit 3 & 4 — Examination 1 (Practice 4). The full paper is worth 40 marks.

| STILL TO COME | QUESTIONS | MARKS |
|---|---|---|
| Examination 1 — technology-free | 4 | 19 |

**The full paper comes with**

- Every question, printed exactly like the ones in this preview
- The complete answer key, with the working behind every mark
- A topic report after marking, showing what to practice next

Get the full paper at

**prepnest.com.au/practice/exams/maths_methods-year_12-4-exam1**

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