Mathematical Methods Unit 3 & 4 — Examination 2 (Practice 5) — Answers & Explanations

Answers to the 12 questions in the free preview.

Section A — multiple choice

1. A. (1, 3)

e^{-x} takes every value in (0, 1) on this domain, so $3 - 2e^{-x}$ takes every value between $3 - 2 = 1$ and 3, with neither endpoint reached.

2. B. f: [2, 5] → R, $f(x) = (x - 2)^2$

Only $(x - 2)^2$ on [2, 5] is one-to-one: it is strictly increasing there. Each of the others takes some value twice.

3. E. $y = 2\sqrt{(3 - x)} + 1$

Let (x', y') be the image. Then $x = 3 - x'$ and $y = (y' - 1)/2$. Substituting into $y = \sqrt{x}$ gives $(y' - 1)/2 = \sqrt{(3 - x')}$, so $y' = 2\sqrt{(3 - x')} + 1$.

4. A. $x = 5\pi/6$ and $x = 7\pi/6$

$\cos(x) = -\sqrt{3}/2$. The related angle is $\pi/6$, and cosine is negative in the second and third quadrants: $\pi - \pi/6$ and $\pi + \pi/6$.

5. B. $a = 4$ and $b = 2$

$y = 0$ requires $x - b = 1$, so $b = 2$. Then $a\log_e(e) = 4$ gives $a = 4$.

6. D. 225

$9^{x+1} = 9 \times (3^x)^2 = 9 \times 25$.

7. E. 3/e

$x_1 = x_0 - f(x_0)/f'(x_0) = 1 - (e - 3)/e = 3/e \approx 1.104$. $\log_e(3) \approx 1.099$ is the exact solution, not the first estimate.

8. B. 0

$x^2 = 9$ gives $x = 3$ or $x = -3$, and $\log_e(x^2)$ is defined for both. Rewriting $\log_e(x^2)$ as $2\log_e(x)$ loses the negative solution.

9. A. $-3/(x - 1)^2$

Quotient rule: $(2(x - 1) - (2x + 1))/(x - 1)^2 = -3/(x - 1)^2$.

10. B. [−1, 3]

$f'(x) = 3x^2 - 6x - 9 = 3(x - 3)(x + 1)$, which is negative between −1 and 3.

11. C. $\log_e(3)$

$[e^{2x}]$ from 0 to $a = e^{2a} - 1 = 8$, so $e^{2a} = 9$ and $a = (1/2)\log_e(9) = \log_e(3)$.

12. C. 1

$g'(x) = f(x) + xf'(x)$, so $g'(2) = 3 + 2 \times (-1) = 1$.

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PREVIEW

That’s the end of the preview answers

These are the answers to the 12 preview questions. The full answer key covers all 24 questions in Mathematical Methods Unit 3 & 4 — Examination 2 (Practice 5), with the working behind every mark.

STILL TO COME	QUESTIONS	MARKS
Section A — multiple choice	8	8
Section B — extended response	4	60

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- Every question, printed exactly like the ones in this preview
- The complete answer key, with the working behind every mark
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