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

Answers to the 12 questions in the free preview.

Section A — multiple choice

1. C. (0.179, 0.261)

$\hat{p} = 88/400 = 0.22$ and the standard error is $\sqrt{(0.22 \times 0.78/400)} \approx 0.0207$. The interval is $0.22 \pm 1.96 \times 0.0207 \approx (0.179, 0.261)$. (0.186, 0.254) uses $z = 1.645$, which gives a 90% interval.

2. E. 6 and [−5, 3]

The period is $2\pi \div (\pi/3) = 6$. The amplitude is 4 about the centre line $y = -1$, so the range is [−5, 3].

3. E. $1 - \Pr(Z < 1.5)$

The standard deviation is $\sqrt{16} = 4$, so $z = (56 - 50)/4 = 1.5$ and $\Pr(X > 56) = \Pr(Z > 1.5) = 1 - \Pr(Z < 1.5)$. 0.375 divides by the variance instead of the standard deviation.

4. D. [1, 4]

For $x \in [-3, 3]$, $9 - x^2$ takes every value from 0 to 9, so $\sqrt{(9 - x^2)}$ ranges over [0, 3] and f over [1, 4].

5. D. 1.75

$x_1 = x_0 - f(x_0)/f'(x_0) = 2 - (8 - 5)/(3 \times 2^2) = 2 - 3/12 = 1.75$. 1.71 is close to the actual root, not the first iteration.

6. E. $(e^2 - 1)/2$

Average value $= (1/(2 - 0))\int e^x \, dx$ from 0 to 2 $= (1/2)(e^2 - 1)$. $e^2 - 1$ forgets to divide by the length of the interval.

7. C. 4.55

$\text{var}(X) = np(1 - p) = 20 \times 0.35 \times 0.65 = 4.55$. 7 is the mean, and 2.13 is the standard deviation.

8. B. $y = 3\log_e(2x - 4)$

Dilating by 1/2 from the y-axis gives $y = \log_e(2x)$; by 3 from the x-axis gives $y = 3\log_e(2x)$; translating 2 right replaces x with $x - 2$: $y = 3\log_e(2(x - 2)) = 3\log_e(2x - 4)$.

9. A. $y = 4x - 9$

$dy/dx = 2x - 2 = 4$ gives $x = 3$, where $y = 9 - 6 = 3$. The tangent is $y - 3 = 4(x - 3)$, that is $y = 4x - 9$.

10. B. 0.0648

$\text{sd}(P) = \sqrt{(p(1 - p)/n)} = \sqrt{(0.3 \times 0.7/50)} = \sqrt{0.0042} \approx 0.0648$. 0.0042 is the variance.

11. C. 4

$2x = \pi/4 + k\pi$, so $x = \pi/8 + k\pi/2$. In $[0, 2\pi]$ this gives $x = \pi/8$, $5\pi/8$, $9\pi/8$ and $13\pi/8$: four solutions. The period of $\tan(2x)$ is $\pi/2$, not π.

12. A. $k = 3$ or $k = -3$

The system has a unique solution unless $3 \times 3 - k \times k = 0$, that is $k = \pm 3$. For $k = 3$ the lines $x + y = 2$ and $x + y = 2/3$ are parallel; for $k = -3$ the lines $x - y = 2$ and $x - y = -2/3$ are parallel. Neither value makes the equations the same line, so both give no solution.

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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 2), with the working behind every mark.

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

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
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