General Mathematics Unit 3 & 4 — Examination 2 (Practice 5) — Answers & Explanations

Answers to the 7 questions in the free preview.

Data analysis

1. (6 marks in total)

a. 11 minutes [1 mark]

Train median 44 − drive median 33 = 11.

b. Drive 15 minutes; train 10 minutes [1 mark]

Drive: 41 − 26 = 15. Train: 48 − 38 = 10.

c. Upper fence = 41 + 1.5 × 15 = 63.5; 75 > 63.5, so it is an outlier. [2 marks]

One mark for the fence, one for the comparison.

d. The train group has the higher median (44 v 33 minutes) but is less variable (IQR 10 v 15 minutes; range 26 v 57 minutes). [2 marks]

One mark for comparing medians, one for comparing a measure of spread.

2. (6 marks in total)

a. run time = 33.47 − 1.06 × training [2 marks]

Using a CAS: intercept 33.4714, slope −1.0571. One mark for each coefficient.

b. $r = -0.997$ [1 mark]

A very strong negative linear association.

c. −0.29 minutes [1 mark]

Predicted = 33.4714 − 1.0571 × 5 = 28.19, and 27.9 − 28.19 = −0.29.

d. $r^2 = 0.994$: 99.4% of the variation in run time is explained by the variation in hours of training. [1 mark]

$r^2 = (-0.9972)^2$.

e. About 20.8 minutes; unreliable, because 12 hours is an extrapolation beyond the data (2 to 8 hours). [1 mark]

33.4714 − 1.0571 × 12 = 20.79.

3. (6 marks in total)

a. 95% [1 mark]

26 and 46 are two standard deviations either side of the mean.

b. 96 [1 mark]

31 cm is one standard deviation below the mean, and 16% of values lie below it: 0.16 × 600 = 96.

c. $z = -1$ [1 mark]

(31 − 36) ÷ 5 = −1.

d. 48 cm [1 mark]

36 + 2.4 × 5 = 48.

e. The flathead: $z = 1.75$ compared with $z = 1.6$ for the snapper. [2 marks]

Snapper: (44 − 36) ÷ 5 = 1.6. Flathead: (52 − 45) ÷ 4 = 1.75. One mark for both z-scores, one for the conclusion.

4. (6 marks in total)

a. Seasonality: bills are highest in Quarter 3 (winter) and lowest in Quarter 2 each year. [1 mark]

A slight increase from Year 1 to Year 2 is also acceptable as a second feature.

b. (520 ÷ 400 + 560 ÷ 425) ÷ 2 = (1.3 + 1.3176) ÷ 2 = 1.31 [2 marks]

The yearly means are (420 + 310 + 520 + 350) ÷ 4 = 400 and (440 + 330 + 560 + 370) ÷ 4 = 425. One mark for the yearly means, one for averaging the ratios.

c. $423 [1 mark]

330 ÷ 0.78 = 423.08.

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d. $578 [2 marks]
Quarter 3 of Year 3 is t = 11. Deseasonalised forecast = 395 + 4.2 × 11 = 441.2. Actual = 441.2 × 1.31 = 577.97. One mark for the trend value, one for reseasonalising.

Recursion and financial modelling

5. (4 marks in total)

a. 15% [1 mark]
38 250 ÷ 45 000 = 0.85, so the value falls by 15% each year.

b. $V_0 = 45\,000$, $V_{n+1} = 0.85V_n$ [1 mark]
Each year the value is 85% of the previous value.

c. $19 967 [1 mark]
$45\,000 \times 0.85^5 = 19\,966.74$.

d. 7 years [1 mark]
After 6 years: $16 971.73. After 7 years: $14 425.97.

6. (4 marks in total)

a. $25 078.55 [1 mark]
Financial solver: N = 12, I% = 7.2, PV = 32 000, PMT = −750 gives FV = −25 078.55.

b. 50 [1 mark]
Solving for N with FV = 0 gives 49.43: 49 full repayments and a smaller 50th.

c. $325.61 [1 mark]
After 49 repayments the balance is $323.67. With one more month of interest at 0.6%: 323.67 × 1.006 = 325.61.

d. $5075.61 [1 mark]
49 × 750 + 325.61 − 32 000 = 5075.61.

7. (4 marks in total)

a. $562.50 [1 mark]
The monthly interest is 0.00375 × 150 000 = 562.50.

b. 220 [1 mark]
Solving for N with PV = −150 000, PMT = 1000 and FV = 0 gives 220.86.

c. $83 850.84 [1 mark]
N = 120 gives FV = 83 850.84.

d. $266 666.67 [1 mark]
1000 ÷ 0.00375 = 266 666.67.

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PREVIEW

That’s the end of the preview answers

These are the answers to the 7 preview questions. The full answer key covers all 13 questions in General Mathematics Unit 3 & 4 — Examination 2 (Practice 5), with the working behind every mark.

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