EXAM PAPER

General Mathematics Unit 3 & 4 — Examination 1 (Practice 5)

PREVIEW
This file has the first 20 of the 40 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: 90 minutes
Total time: 105 minutes

SECTIONS IN THIS PAPER

- Data analysis — 36 min (calculator allowed)
- Recursion and financial modelling — 18 min (calculator allowed)
- Matrices — 18 min (calculator allowed)
- Networks and decision mathematics — 18 min (calculator allowed)

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.

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Data analysis

36 minutes • Calculator allowed

1. A hospital records each patient’s blood type (A, B, AB or O) and the number of nights they stay in hospital. These two variables are, respectively,

A. categorical nominal and numerical discrete

B. categorical ordinal and numerical discrete

C. categorical nominal and numerical continuous

D. numerical discrete and numerical continuous

E. categorical ordinal and categorical nominal

2. The histogram below shows the ages of the 40 people in a yoga class. The percentage of the class aged 40 years or older is



A. 22%

B. 35%

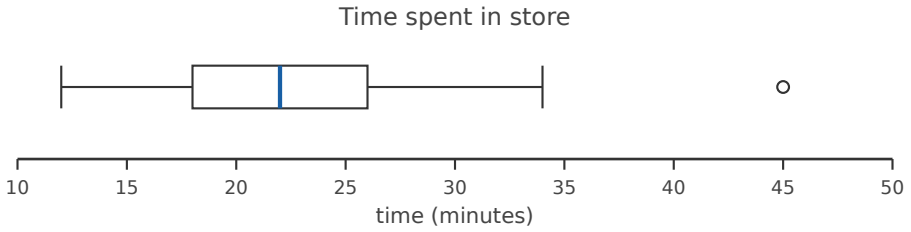
C. 45%

D. 55%

E. 57.5%

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3. The box plot below shows the times, in minutes, that customers spent in a hardware store. Which one of the following statements is true?



A. The interquartile range is 8 minutes and the value of 45 minutes lies beyond the upper fence of 38 minutes.

B. The range is 22 minutes.

C. The median is 26 minutes.

D. About 25% of customers spent between 12 and 22 minutes in the store.

E. The distribution is negatively skewed.

4. The lengths of 1200 fish in a pond are approximately normally distributed with a mean of 30 cm and a standard deviation of 4 cm. Using the 68–95–99.7% rule, the number of fish expected to be longer than 38 cm is

A. 3

B. 18

C. 30

D. 60

E. 192

5. Scores on an aptitude test are approximately normally distributed with a mean of 70 and a standard deviation of 6. Using the 68–95–99.7% rule, the score at the 84th percentile is

A. 64

B. 75

C. 76

D. 82

E. 84

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6. The two-way frequency table below shows the smoking status of 250 adults by gender. Of the non-smokers, the percentage who are female, correct to one decimal place, is

Smoking status by gender

	Male	Female	Total
Smoker	20	15	35
Non-smoker	105	110	215
Total	125	125	250

A. 44.0%

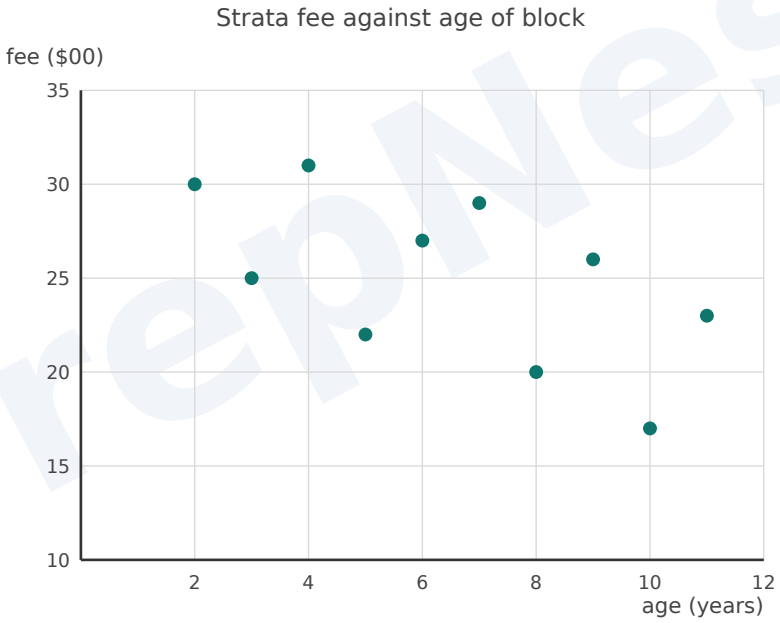
B. 48.8%

C. 51.2%

D. 86.0%

E. 88.0%

7. The scatterplot below shows, for ten apartment blocks, the age of the block in years and the monthly strata fee in hundreds of dollars. The correlation coefficient is $r = -0.60$. The association is best described as



A. strong, negative and linear

B. moderate, negative and linear

C. weak, negative and linear

D. moderate, positive and linear

E. strong, negative and non-linear

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8. For a set of bivariate data, the correlation coefficient is r = 0.8. The percentage of the variation in the response variable that is not explained by the variation in the explanatory variable is

A. 10.6%

B. 20%

C. 36%

D. 64%

E. 80%

9. The least squares line time = 12.4 + 1.8 × distance is used to predict delivery time, in minutes, from distance, in kilometres. A delivery of 15 km took 36 minutes. The residual for this delivery, in minutes, is

A. −3.4

B. −2.6

C. 3.4

D. 36

E. 39.4

10. A log transformation is applied to the response variable, and the least squares line $\log_{10}(y) = 0.5 + 0.3x$ is fitted. The value of y predicted when x = 5 is

A. 2

B. 3.16

C. 20

D. 100

E. 1000

11. A least squares line is fitted to the heights of children aged 2 to 10 years. Using the line to predict the height of a 30-year-old is unreliable because

A. it is an extrapolation beyond the ages in the data

B. the correlation between age and height is negative

C. height is a categorical variable

D. the residuals must all be zero

E. it is an interpolation within the ages in the data

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12. When a four-point moving average is used to smooth a time series, the result is centred because

A. otherwise the average would be too large

B. otherwise the average would sit between two time periods

C. centring removes the seasonal component

D. centring is needed only when the data contain outliers

E. an odd number of points must never be used

13. A business calculates monthly seasonal indices. The indices for eleven of the months sum to 11.12. The seasonal index for the remaining month is

A. 0.12

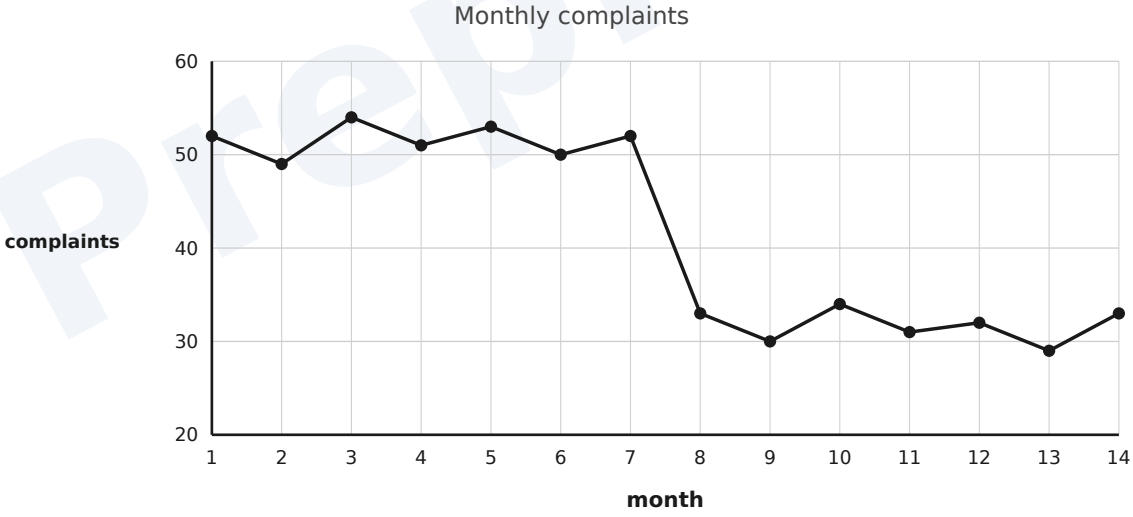
B. 0.88

C. 1.00

D. 1.12

E. 11.12

14. The time series plot below shows the monthly number of complaints received by a council over 14 months. The most noticeable feature of the plot is



A. seasonality

B. an increasing trend

C. an outlier

D. cycles with a period of about three months

E. a structural change

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15. Wheat yield is to be predicted from growing-season rainfall using the data in the table below. Using a CAS, the equation of the least squares line, with coefficients correct to four significant figures, is

Rainfall and wheat yield

Growing-season rainfall (mm)	250	300	340	380	420	470	510	560
Yield (tonnes per hectare)	1.6	2	2.3	2.5	2.9	3.2	3.4	3.9

A. yield = −0.1752 + 0.007183 × rainfall

B. yield = 0.007183 − 0.1752 × rainfall

C. yield = −0.1752 + 0.07183 × rainfall

D. rainfall = 26.12 + 138.6 × yield

E. yield = 2.725 + 0.007183 × rainfall

16. For the data in the table below, the correlation coefficient between rainfall and wheat yield, correct to three decimal places, is

Rainfall and wheat yield

Growing-season rainfall (mm)	250	300	340	380	420	470	510	560
Yield (tonnes per hectare)	1.6	2	2.3	2.5	2.9	3.2	3.4	3.9

A. −0.998

B. 0.007

C. 0.958

D. 0.995

E. 0.998

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Recursion and financial modelling

18 minutes • Calculator allowed

17. An amount of $4000 is invested at 3.5% per annum simple interest. A recurrence relation for the value V_n of the investment after n years is

A. $V_0 = 4000$, $V_{n+1} = 1.035V_n$

B. $V_0 = 4000$, $V_{n+1} = V_n + 140$

C. $V_0 = 4000$, $V_{n+1} = V_n + 3.5$

D. $V_0 = 4000$, $V_{n+1} = 1.035V_n + 140$

E. $V_0 = 4000$, $V_{n+1} = 0.035V_n$

18. The value of a machine is modelled by $V_0 = 20\,000$, $V_{n+1} = 0.85V_n$, where n is the number of years. The value first falls below half of its purchase price after

A. 3 years

B. 4 years

C. 5 years

D. 6 years

E. 7 years

19. Which one of the following investments has the highest effective annual interest rate?

A. 5.00% per annum, compounding annually

B. 4.90% per annum, compounding monthly

C. 4.85% per annum, compounding daily

D. 4.80% per annum, compounding weekly

E. 4.95% per annum, compounding quarterly

20. A loan of $25 000 is charged interest at 7.8% per annum, compounding monthly, and is repaid at $600 per month. The number of monthly repayments needed to repay the loan in full is

A. 41

B. 42

C. 48

D. 49

E. 50

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40.

20 questions locked, up to question 40.

PREVIEW

That’s the end of the preview

You’ve seen the first 20 of the 40 questions in General Mathematics Unit 3 & 4 — Examination 1 (Practice 5). The full paper is worth 40 marks.

STILL TO COME	QUESTIONS	MARKS
Recursion and financial modelling	4	4
Matrices	8	8
Networks and decision mathematics	8	8

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

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