

GENERAL MATHEMATICS

Units 3 & 4 – Written examination 2



2024 Trial Examination

SOLUTIONS

Question 1.

a. 2 (*ID* and *neonatal care*)

1 mark

b. $\frac{10}{15} \times 100 = 66.7\%$

1 mark

c.

i. 3613.7

1 mark

ii. 3481.0

1 mark

iii. $IQR = 4122 - 3100 = 1022$

1 mark

d. $\bar{x} = 38.8$, $S_x = 3.55$
 $\bar{x} + 2S_x = 45.9$

1 mark

e. $Upper\ fence = 41 + 1.5(41 - 37) = 47$
 $Maximum = 45$

Since the maximum is less than the upper fence, hence it is not an outlier.

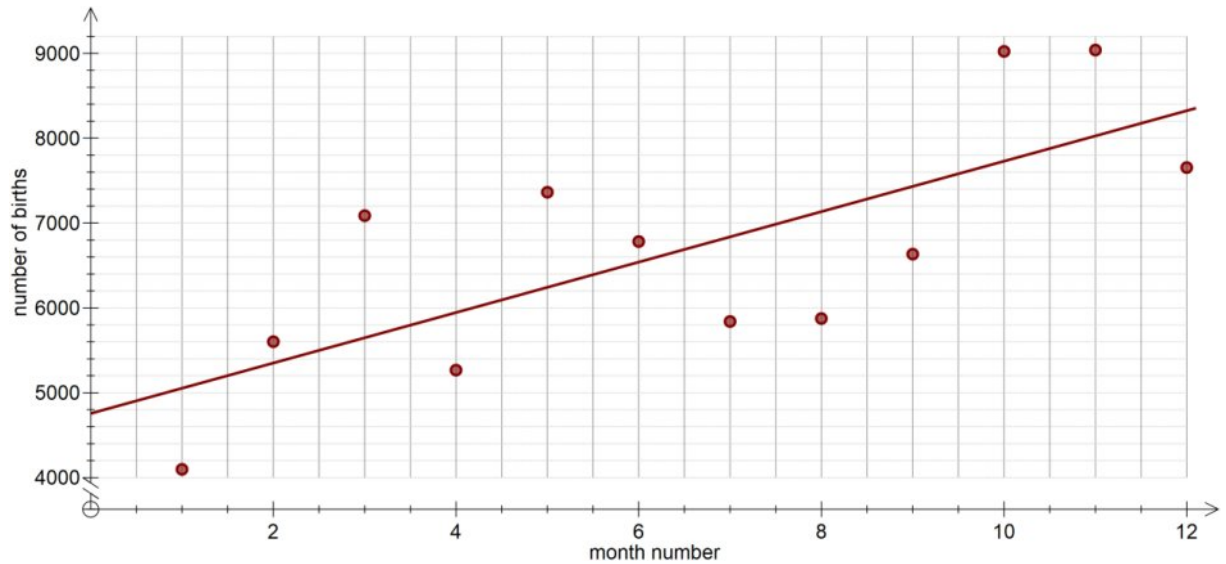
1 mark

Question 2.

a. *Number of births* = $297.3 + 4756 \times \text{month number}$

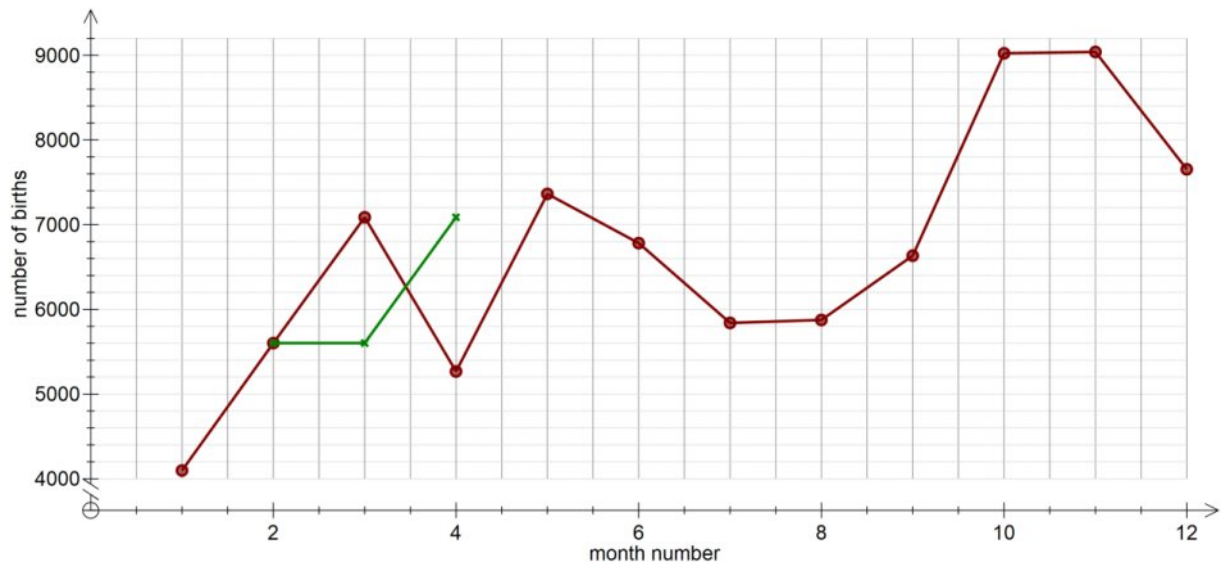
2 marks

b.



1 mark

c.

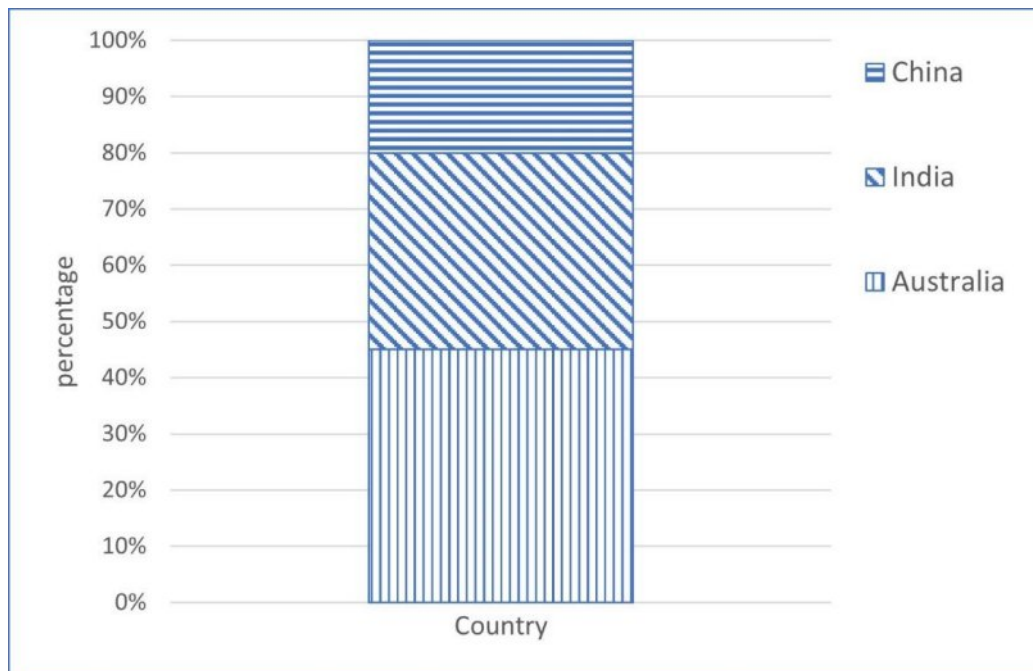


2 marks

Question 3.**a.**

Country	<i>Frequency</i>	
	Number	Percentage (%)
Australia	9	45
India	7	35
China	4	20
Total	20	100

2 marks

b.

1 mark

c.**i.** *Location*

1 mark

- ii.** Yes, there is an association between age group and location. In Victoria, 40% of newborn babies were born to others in the age group 30-34 years as compared to only 33% of newborn babies born to mothers in the age group 30-34 years.

2 marks

Question 4.

a.

i. $r = \sqrt{0.5820} = 0.7629$

1 mark

- ii. The association between month number and number of people employed is positive, linear and strong.

1 mark

- b. February 2023 is month number 50. Hence this prediction is an extrapolation.

1 mark

Question 5.

Yearly average

$$= \frac{650 + 758 + 790 + 810 + 1020 + 1134 + 1765 + 1468 + 1673 + 650 + 518 + 422}{12}$$

$$= 971.5$$

$$\text{Seasonal index for June} = \frac{1134}{971.5} = 1.17$$

2 marks

Question 6.

a. $\frac{7.2}{4} = 1.8\%$

1 mark

b. $L_1 = 1.018 \times 40000 - 2067.33 = 38652.67$
 $L_2 = 1.018 \times 38652.67 - 2067.33 = 37281.09$

1 mark

c.

N:	24.	▶
I(%):	7.2	▶
PV:	40000.	▶
Pmt:	-2067.23	▶
FV:	-0.10096556567	▶
PpY:	4	▲ ▼

Final repayment = $2067.23 + 0.10 = 2067.33$

1 mark

d. $2067.33 \times 24 + 0.10 = 49616.02$
 $\frac{9616.02}{40000} \times 100 = 24\%$

1 mark

Question 7.

a. $1 + \frac{r}{5200} = 1.006 \rightarrow r = 3.12\%$

1 mark

b. \$140

N:	156.	▶
I(%):	3.12	▶
PV:	-25000.	▶
Pmt:	-139.99999947047	▶
FV:	50339.81	▶
PpY:	52	▲ ▼

1 mark

c.

N:	156.	▶
I(%):	3.12	▶
PV:	-25000.	▶
Pmt:	-120.	▶
FV:	47070.157172172	▶
PpY:	52	▲ ▼

$$\text{Interest} = 47070.16 - 156 \times 120 - 25000 = \$3350.16$$

2 marks

Question 8.

a. $\frac{2300}{500000} \times 100 = 0.46\%$

1 mark

b.

Payment number	Payment (\$)	Interest (\$)	Principal reduction (\$)	Balance (\$)
0	0.00	0.00	0.00	500 000.00
1	3442.00	2300.00	1142.00	498 858.00
2	3442.00	2294.75	1147.25	497 710.75
3	3442.00	$\frac{0.46}{100} \times 497710.75$ $= 2289.47$	$3442 - 2289.47$ $= 1152.53$	496558.22

2 marks

c.

N:	240.3928630936	▶
I(%):	5.52	▶
PV:	-500000.	▶
Pmt:	3442.	▶
FV:	0.	▶
PpY:	12	▲ ▼

240 months or 20 years

1 mark

Question 9.

a. p_{31}

1 mark

b. $N = [182 \quad 145 \quad 218]$

1 mark

c. $[1 \quad 0 \quad 1] \begin{bmatrix} 28 \\ 36 \\ 102 \end{bmatrix} = [130]$

1 mark

Question 10.

a.

$$R \times \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{bmatrix} = [4543400]$$

The total revenue collected by selling tickets on the first five days of the theme park opening.

2 marks

b.

$$\begin{bmatrix} 1 \\ 5 \end{bmatrix} \times R \times \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{bmatrix} = [908680]$$

2 marks

c. $k = 0.9$

1 mark

Question 11.

a. $A-B-D-C-E$

1 mark

b. $r = 2$

1 mark

Question 12.

$$\begin{bmatrix} 790 \\ 410 \end{bmatrix} = \begin{bmatrix} 0.85 & 0.80 \\ 0.15 & 0.20 \end{bmatrix} \begin{bmatrix} 760 \\ 395 \end{bmatrix} + B$$

$$\begin{bmatrix} 790 \\ 410 \end{bmatrix} = \begin{bmatrix} 962 \\ 193 \end{bmatrix} + B$$

$$B = \begin{bmatrix} 790 \\ 410 \end{bmatrix} - \begin{bmatrix} 962 \\ 193 \end{bmatrix} = \begin{bmatrix} -172 \\ 217 \end{bmatrix}$$

2 marks

Question 13.

a.

i.

$$\boxed{5} + \boxed{3} = \boxed{6} + \boxed{2}$$

v f e

1 mark

ii. Planar

1 mark

b. Sum = $3 + 1 + 3 + 3 + 2 = 12$

1 mark

c. AB

1 mark

Question 14.

a. $M-P-Q-R$

Minimum distance = 0.7 km

1 mark

b.

i. $M-N-O-T-S-R-Q-P-M$

1 mark

ii. Hamiltonian cycle

1 mark

c.

i. Eulerian trail

1 mark

ii. For an Eulerian trail to exist, all vertices must be even or exactly two vertices must be odd. In this graph there are four vertices with odd degree (M, N, R, P)

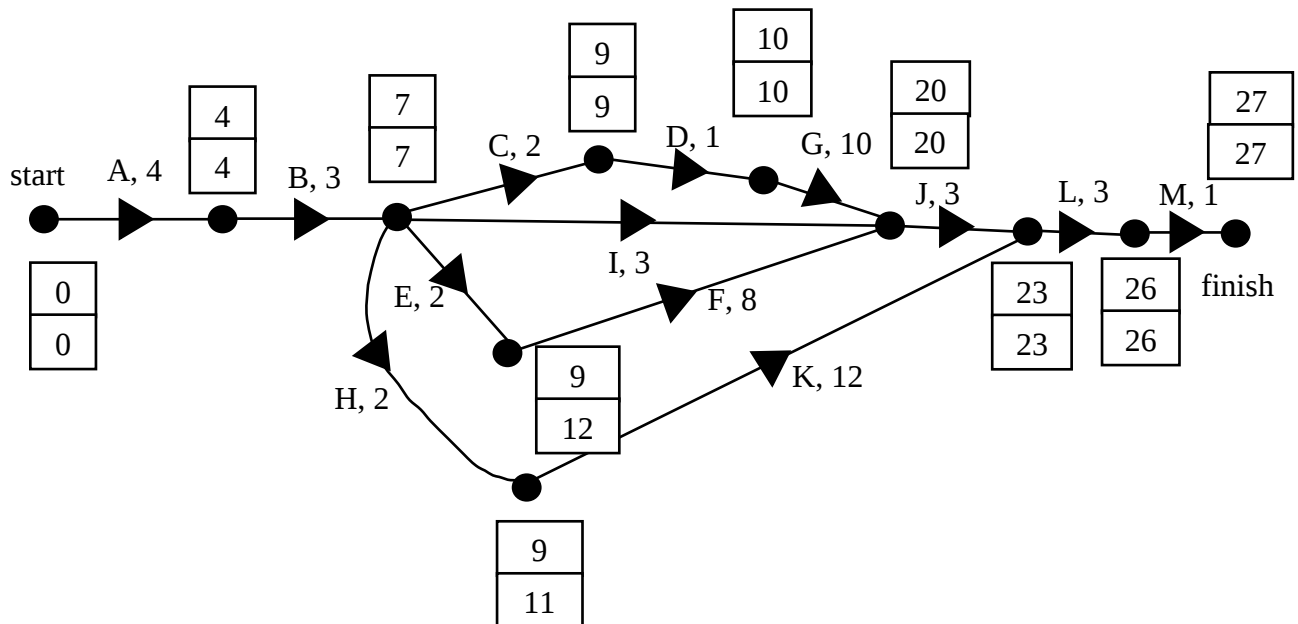
1 mark

Question 15.

a. L

1 mark

b.



Float time for activity E is 3 days ($12 - 9$)

1 mark

c. K is not on the critical path, hence crashing it will not reduce the completion time of the project.

1 mark