MATHEMATICS APPLICATIONS

MAWA Semester 1 (Unit 3) Examination 2018

Calculator-Assumed

Marking Key

The release date for this exam and marking scheme is

- **the end of week 8 of term 2, 2018**

Section Two: Calculator-assumed (100 Marks)

Question 7 (a)

Solution

As population increases so does the number of people migrating overseas

Marking key/mathematical behaviours	Marks
• describes the association	1

Question 7 (b)

Solution

It is possible but unlikely as an increase in population does not cause migration. Association does not guarantee causality.

Marking key/mathematical behaviours	Marks
• concludes correctly	1
• explains role of causality	1

Question 7 (c)

Solution

Confounding – both of these variables are influenced by / associated with another variable which has a similar effect on both of these variables.
These two variables may be responding to the current population with each state.

Marking key/mathematical behaviours	Marks
• explains confounding	1
• identifies another variable	1

Question 8 (a)

Solution

$L_1 = 10, \quad L_{n+1} = L_n + 0.4$

Marking key/mathematical behaviours	Marks
• determines recurrence growth	1
• identifies first term	1

Question 8 (b)

Solution

20 = 10 + 25 x 0.4 So at the end of the 26th week

Marking key/mathematical behaviours	Marks
• determines equation to solve / lists terms of the sequence	1
• determines term number	1

Question 8 (c)

Solution

Klind. Growth is at 0.8 km per week but in Fland it is 0.4 km per week

Marking key/mathematical behaviours	Marks
• identifies sequence with fastest rate	1
• explains conclusion	1

Question 8 (d)

Solution

$4 + 0.8n = 9.6 + 0.4n \rightarrow n = 14$

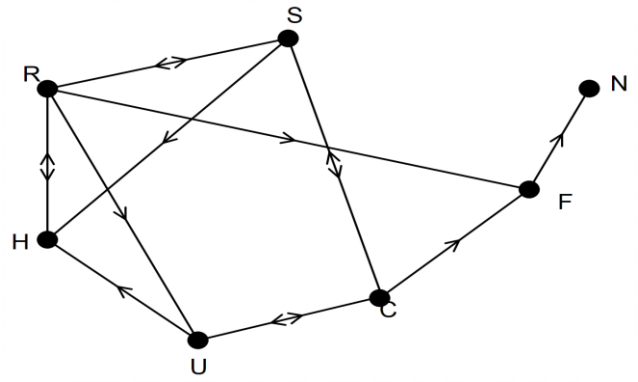
OR

10	10.4	10.8	11.2	11.6	12.0	12.4	12.8	13.2	13.6	14.0	14.4	14.8	15.2
4.8	5.6	6.4	7.2	8.0	8.8	9.6	10.4	11.2	12.0	12.8	13.6	14.4	15.2

Marking key/mathematical behaviours	Marks
• determines term number	1
• justifies conclusion	1

Question 9 (a)

Solution



Marking key/mathematical behaviours	Marks
• marks all routes	1
• correct markings on 2-way routes	1
• correct markings on one-way routes	1

Question 9 (b)

Solution

NF is a bridge – without it the netball centre is not connected

Marking key/mathematical behaviours	Marks
• identifies bridge	1
• explains selection	1

Question 9 (c)

Solution Yes – because it can be drawn without paths crossing	
Marking key/mathematical behaviours	Marks
• correctly concludes • explains conclusions	1 1

Question 10 (a)

Solution Positive, strong, linear	
Marking key/mathematical behaviours	Marks
• describes relationship as strong • describes relationship as approaching linear • describes relationship as positive	1 1 1

Question 10 (b)

Solution response	
Marking key/mathematical behaviours	Marks
• identifies response variable	1

Question 10 (c)(i)(ii)

Solution WBGT = 0.62 x AT + 6.15 r=0.9258	
Marking key/mathematical behaviours	Marks
• identifies gradient and intercept • expresses relationship as linear with correct variables • identifies correlation coefficient	1 1 1

Question 10 (d)

Solution 0.62 x 25 + 6.15 = 21.7	
Marking key/mathematical behaviours	Marks
• uses relationship to predict temperature	1

Question 10 (e)

Solution

Fairly reliable
- correlation coefficient is close to 1
- uses interpolation

Marking key/mathematical behaviours	Marks
• concludes correctly	1
• gives first reason for conclusion	1
• gives second reason for conclusion	1

Question 10 (f)

Solution

(i) smaller
(ii) smaller

Marking key/mathematical behaviours	Marks
• selects best option for change in correlation coefficient	1
• selects best option for change in gradient	1

Question 11 (a)

Solution

Decreasing exponential

Marking key/mathematical behaviours	Marks
• identifies decreasing	1
• identifies type of decreasing	1

Question 11 (b)

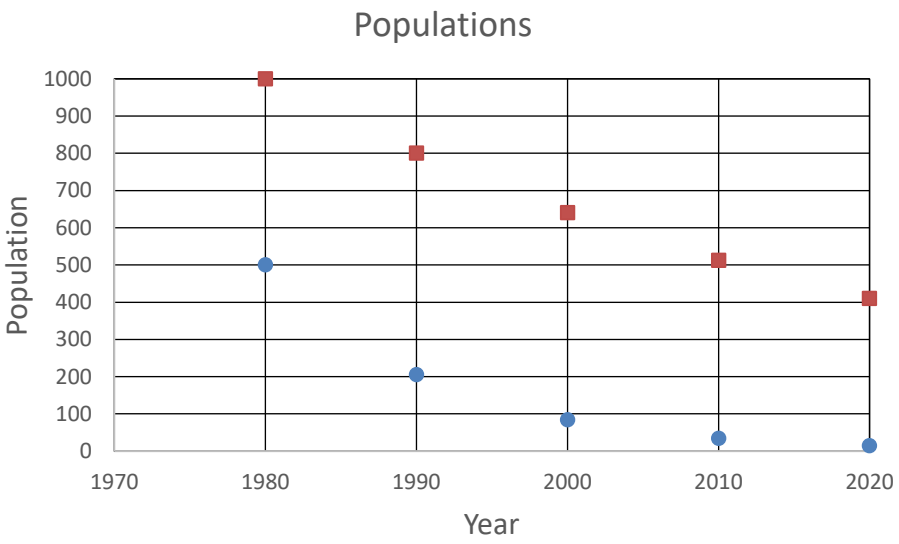
Solution

Year	1980	1990	2000	2010	2020
Population	1000	800	640	512	410

Marking key/mathematical behaviours	Marks
• enters 3 correct values	1
• enters a further 2 correct values	1

Question 11 (c)

Solution



Marking key/mathematical behaviours	Marks
• correctly plots three values	1
• correctly plots further two values	1

Question 11 (d)

Solution

n = 18 so 2160

Marking key/mathematical behaviours	Marks
• determines which term	1
• states value of term	1

Question 11 (e)

Solution

(i) rhinos
(ii) rhinos
(iii) both

Marking key/mathematical behaviours	Marks
• identifies faster rate	1
• identifies difference in terms	1
• identifies geometric sequences	1

Question 12 (a)

Solution

(i) They can all be drawn in the plane without any edges crossing

(ii)

Number of vertices (v)	Number of edges (e)	Number of faces (f)	$v + f - e$
5	4	1	2
5	5	2	2
5	5	2	2
5	6	3	2
5	7	4	2
5	8	5	2

Marking key/mathematical behaviours	Marks
• describes planarity	1
• completes first column with given data	1
• completes last column	1
• determines number of edges in each graph	1
• determines number of internal faces	1
• includes external faces	1

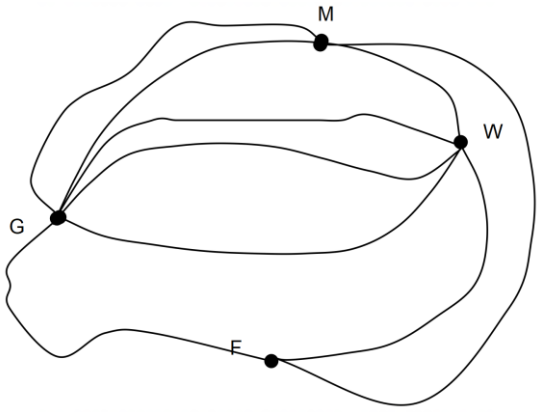
Question 12 (b)

Solution

(i) multiple edges from W to G OR M to G

(ii) G

(iii)



Marking key/mathematical behaviours	Marks
• identifies multiple edges between two nodes	1
• identifies vertex with highest degree	1
• redrawn with same number of vertices	1
• redrawn with same number of edges	1
• redrawn so no edges cross	1

Question 13 (a)

Solution 420	
Marking key/mathematical behaviours	Marks
• determines total in column / row	1

Question 13 (b)

Solution Dog ownership gender	
Marking key/mathematical behaviours	Marks
• identifies one categorical variable	1
• identifies second categorical variable	1

Question 13 (c)

Solution 35% 15% 50%	
Marking key/mathematical behaviours	Marks
• determines correct percentages	1
• rounds to the nearest integer	1

Question 13 (d)

Solution Males favoured Option 3 whereas females favoured Option 1 The least favoured options for males (or females) was Option 2 at 15% or 20% and this was lower than for other options selected by males	
Marking key/mathematical behaviours	Marks
• describes one association	1
• provides data from the table to support description	1

Question 13 (e)

Solution Comparisons can only be made when the values are comparable eg percentages Cannot compare the numbers when the totals are different	
Marking key/mathematical behaviours	Marks
• describes ability to compare values	1

Question 14 (a)

Solution	
arithmetic	
Marking key/mathematical behaviours	Marks
• identifies pattern in arithmetic sequence	1

Question 14 (b)

Solution	
$A_n = 12 + (n-1) \times 1.4$	
Marking key/mathematical behaviours	Marks
• identifies starting value and increasing amount	1
• determines an expression to show arithmetic sequence	1

Question 14 (c)

Solution	
$A_{10} = 12 + (9) \times 1.4 = 24.6$	
Marking key/mathematical behaviours	Marks
• substitutes into rule	1
• determines 10th term	1

Question 14 (d)

Solution	
$B_{n+1} = \frac{4.6}{4} B_n \quad OR \quad B_{n+1} = 1.15 B_n$	
Marking key/mathematical behaviours	Marks
• determines recurrence relation	1

Question 14 (e)

Solution	
Using table function on CAS, sequence = 98.8 when n = 63 and 100.2 when n = 64 So n = 64	
Marking key/mathematical behaviours	Marks
• provides evidence of attempt to solve equation	1
• presents n as an integer	1

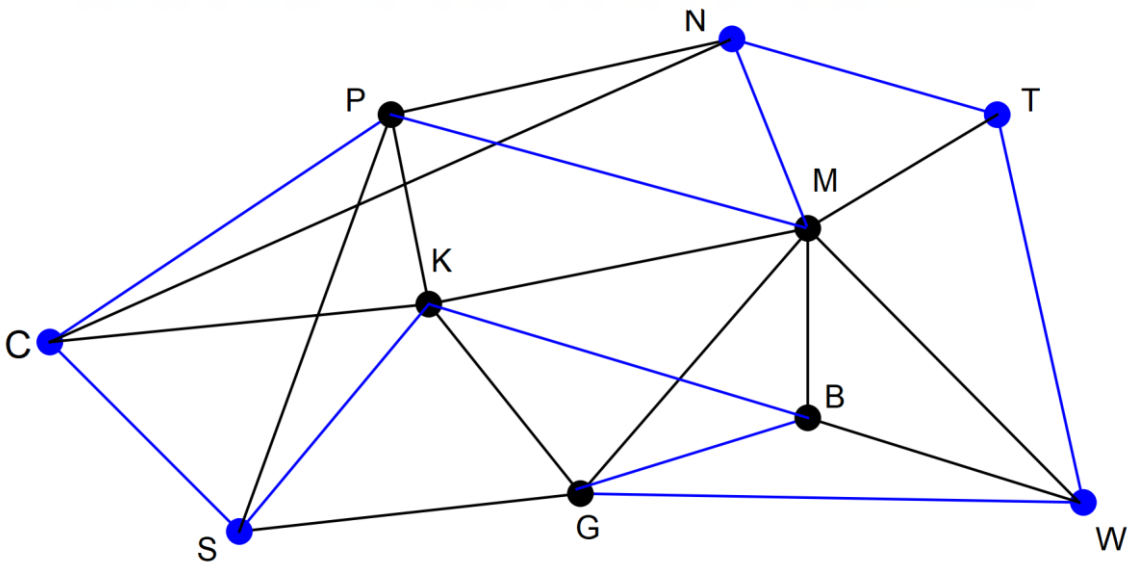
Question 14 (f)

Solution	
B is increasing faster than A. At n = 16, A is 33 and B is 32.548. This is as close as they get	
Marking key/mathematical behaviours	Marks
• identifies term number 16	1

• justifies by providing values or list of values	1

Question 15 (a)

Solution



Marking key/mathematical behaviours	Marks
• marks given route	1

Question 15 (b)

Solution

No. Vertex C is not linked to G

Marking key/mathematical behaviours	Marks
• determines correct conclusion	1
• justifies conclusion	1

Question 15 (c)

Solution

Starts and ends at the same vertex
No repeated edges
No repeated vertices

Marking key/mathematical behaviours	Marks
• identifies first reason	1
• identifies second reason	1
• identifies third reason	1

Question 15 (d)

Solution

Hamiltonian

Marking key/mathematical behaviours	Marks
• identifies cycle is Hamiltonian	1

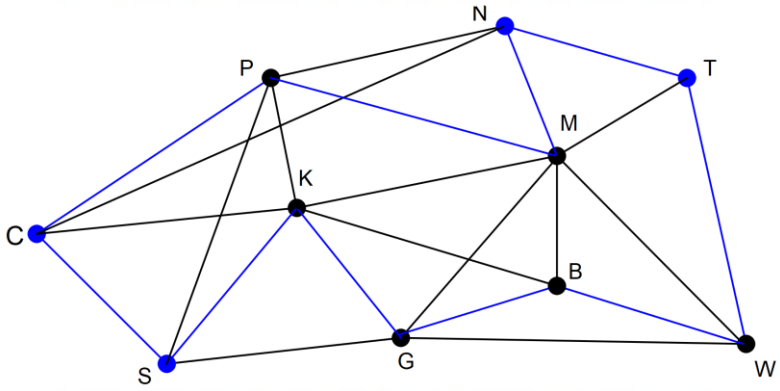
Question 15 (e)

Solution 10 (edges)	
Marking key/mathematical behaviours	Marks
• identifies length of cycle	1

Question 15 (f)

Solution

CPMNTWBGKSC



Marking key/mathematical behaviours	Marks
• names another route	1
• shows route on diagram	1

Question 16 (a)

Solution No edges are repeated Starts and finishes at different vertices	
Marking key/mathematical behaviours	Marks
• identifies feature of trail	1
• identifies feature of being open	1

Question 16 (b)

Solution QHYQGPRHBRZBGZ	
Marking key/mathematical behaviours	Marks
• starts and finishes at an odd vertex	1
• all edges covered once only	1
• all destinations visited	1

Question 16 (c)

Solution Semi- eulerian It has a open trail – every edge is included and the trail finishes at a vertex other than the starting vertex	
Marking key/mathematical behaviours	Marks
• concludes graph is semi-eulerian • identifies open • identifies trail	1 1 1

Question 16 (d)

Solution Vertex must have an even degree	
Marking key/mathematical behaviours	Marks
• identifies conditions for an additional vertex	1

Question 17 (a)

Solution 99.27	
Marking key/mathematical behaviours	Marks
• interprets the coefficient of determination	1

Question 17 (b)

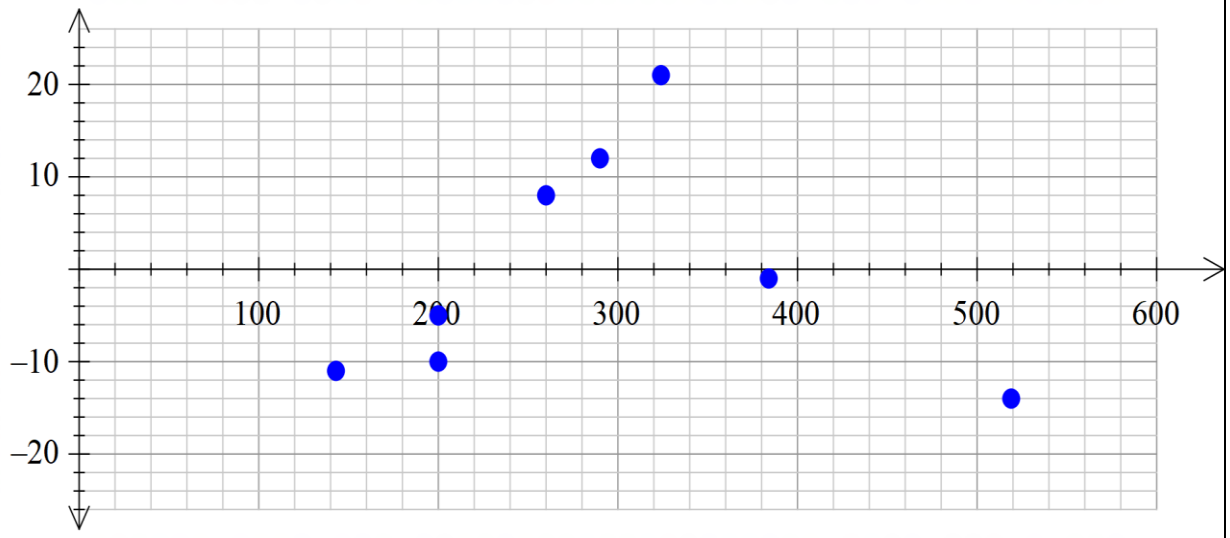
Solution

Residuals	-11	-10	-5	8	12	21	-1	-14

Marking key/mathematical behaviours	Marks
• uses cost – predicted cost • determines residuals	1 1

Question 17 (c)

Solution



Marking key/mathematical behaviours	Marks
• scales horizontal axis	1
• scales vertical axis	1
• plots 4 correct values	1
• plots another 4 correct values	1

Question 17 (d)

Solution

Residuals are randomly scattered around the x-axis

Marking key/mathematical behaviours	Marks
• identifies condition for linear relationship	1