MATHEMATICS APPLICATIONS

MAWA Semester 2 (Units 3 & 4) Examination 2017

Calculator-free

Marking Key

Section One: Calculator-free (50 Marks)

Question 1 (a)

Solution

$T_2 = 2$, $T_3 = 0.5 \times 2 - 8 = -7$

Marking key/mathematical behaviours	Marks
• identifies second term	1
• determines an expression for the third term	1
• calculates third term	1

Question 1 (b)

Solution

$T_n = -4n + 9$, $n=50$

Marking key/mathematical behaviours	Marks
• deduces and expression for the nth term	1
• determines $-4n = -200$	1
• determines $n = 50$	1

Question 2 (a)

Solution

Each edge represents a connection between stations

Marking key/mathematical behaviours	Marks
• identifies representation of an edge	1

Question 2 (b)

Solution

CMEKPNRZWHT or CHTRZWEMNPK

Marking key/mathematical behaviours	Marks
Identifies a route which	
• starts at C and ends at a different node	1
• travels through each node once only	1
• has no repeated edges	1

Question 2 (c)

Solution

The graph can be drawn in 2 dimensions without any edges crossing

Marking key/mathematical behaviours	Marks
• describes planarity	1

Question 2 (d)

Solution

$v = 11$, $f = 11$, $e = 20$.
$v + f - e = 2$

Marking key/mathematical behaviours	Marks
• determines values for the numbers of faces, edges and vertices	1
• expresses the relationship between e, f and v	1

Question 2 (e)

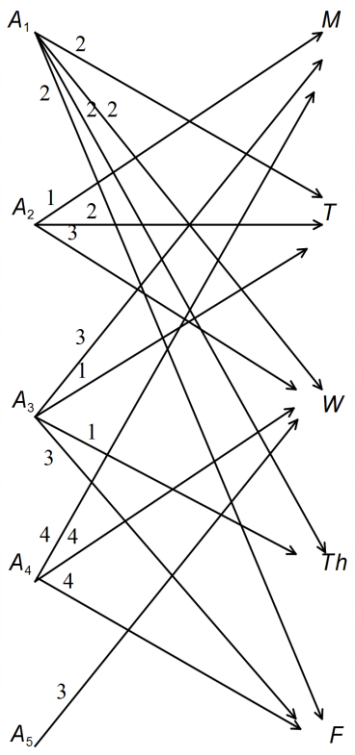
Solution

(i) Louise would need to come back through R or H to reach T and Z and one of the conditions is to visit each station only once.
(ii) NEM, NEW

Marking key/mathematical behaviours	Marks
• describes inability to meet a necessary condition	1
• identifies alternate incorrect starting route	1

Question 3 (a)

Solution



Marking key/mathematical behaviours	Marks
• 10 edges correctly weighted	1
• 15 edges correctly weighted	1
• 10 edges correctly positioned	1
• 15 edges correctly positioned	1

Question 3 (b)

Solution

$$\begin{bmatrix} 3 & 0 & 4 & 0 \\ 1 & 2 & 3 & 2 \\ 4 & 3 & 4 & 5 \\ 5 & 2 & 1 & 2 \end{bmatrix} \text{-->} \begin{bmatrix} 2 & 5 & 1 & 5 \\ 4 & 3 & 2 & 3 \\ 1 & 2 & 1 & 0 \\ 0 & 3 & 4 & 3 \end{bmatrix} \text{-->} \begin{bmatrix} 1 & 4 & 0 & 4 \\ 2 & 1 & 0 & 1 \\ 1 & 2 & 1 & 0 \\ 0 & 3 & 4 & 3 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 3 & (0) & 4 \\ 2 & (0) & 0 & 1 \\ 1 & 1 & 1 & (0) \\ (0) & 2 & 4 & 3 \end{bmatrix}$$

Maximum number of hours is 16
V_1 comes on Wednesday
V_2 comes on Tuesday
V_3 comes on Thursday
V_4 comes on Monday

Marking key/mathematical behaviours	Marks
• subtracts every number from the maximum number	1
• reduces two rows	1
• reduces further two rows	1
• identifies maximum number of hours	1
• describes allocation of volunteers	1

Question 4 (a)

Solution

B. The weekly allowance is \$1100 whereas it is \$1000 in both A and C.

Marking key/mathematical behaviours	Marks
• identifies correct rule	1
• explains choice of rule	1

Question 4 (b)

Solution

C. 1.10 as the ratio represents 110% so a 10% increase each year.

Marking key/mathematical behaviours	Marks
• identifies correct rule	1
• explains choice of rule	1

Question 4 (c)

Solution

Amount = 1.05 x 500 000 – 1000 x 52
= 500 000 + 25000 – 52000
= $473 000

Marking key/mathematical behaviours	Marks
• determines 5% of 500 000	1
• calculates value after one year	1

Question 4 (d)

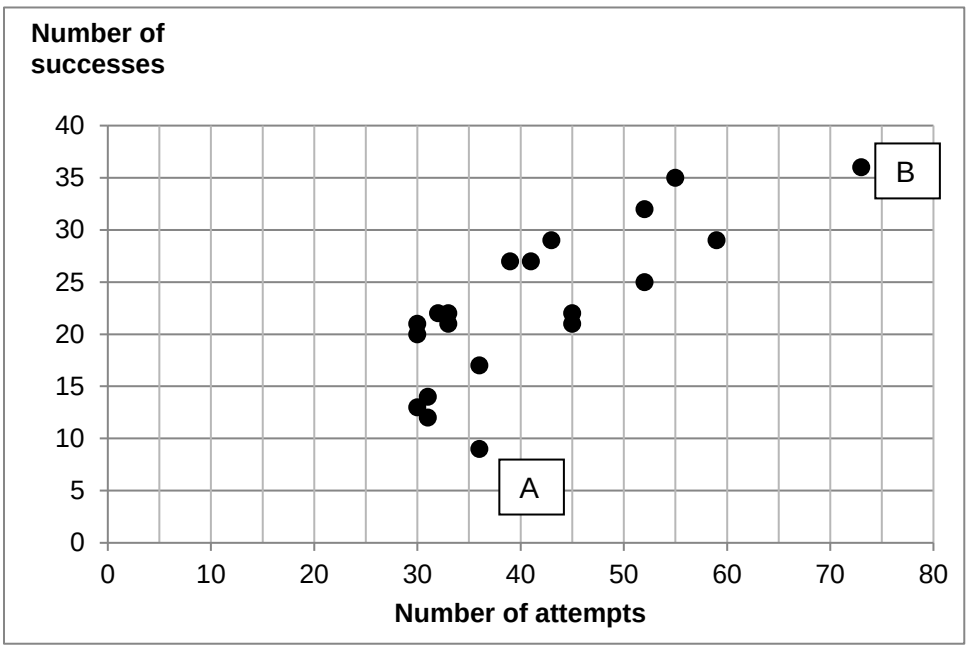
Solution

Rule C
The payout is the same each year as A but the rate of growth is higher than in A.
In B the growth is 8% per year which is lower than in C and the payout is higher by $100.
This mean the investment is growing at a slower rate and reducing by more money each year.

Marking key/mathematical behaviours	Marks
• compares the influence of the rates for A, B, C	1
• identifies the significance of the different amounts transferred	1
• concludes that C is the best option	1

Question 5 (a)

Solution



Marking key/mathematical behaviours	Marks
• plots and labels A	1
• plots and labels B	1

Question 5 (b)

Solution Number of attempts	
Marking key/mathematical behaviours	Marks
• identifies explanatory variable	1

Question 5 (c)(i)(ii)

Solution (i) You cannot get a success of 2.3 with 0 attempts because there are no successes possible OR a success cannot be fractional. (ii) 5. The rate is 0.5 successes per attempt and 0.5 of 10 is 5	
Marking key/mathematical behaviours	Marks
• interprets the vertical intercept	1
• determines change in the number of successes	1
• interprets the gradient	1

Question 5 (d)

Solution ABOVE For the same number of attempts their number of successes is greater so they would be above the same number of attempts as a less successful player	
Marking key/mathematical behaviours	Marks
• interprets scatter plot	1
• explains positioning on scatter plot	1

Question 5 (e)

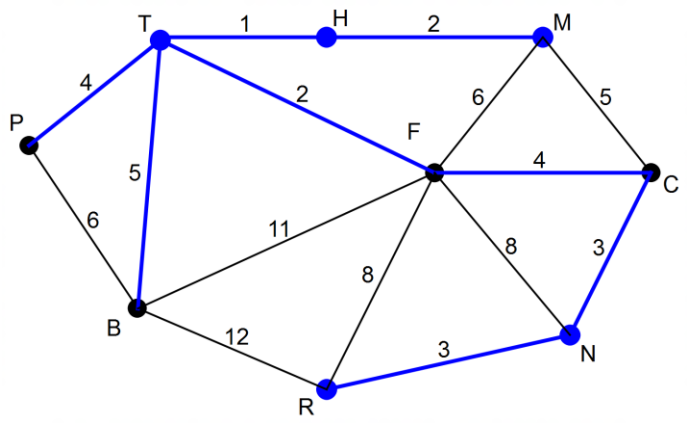
Solution INCREASE There is less variation as only the least successful players are left	
Marking key/mathematical behaviours	Marks
• concludes a lower correlation coefficient	1
• explains the lower correlation coefficient	1

Question 5 (f)

Solution C	
Marking key/mathematical behaviours	Marks
• identifies most likely residual plot	1

Question 6 (a)

Solution



24 km

Marking key/mathematical behaviours	Marks
• identifies 8 correct roads and not incorrect roads	1
• identifies a further 2 correct roads without any incorrect roads	1
• determines length of cycle paths	1

Question 6 (b)

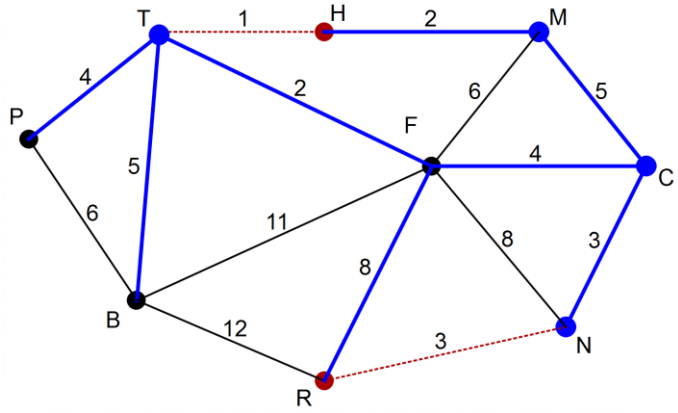
Solution

PB, BR, BF, RF, FB, FN, BC

Marking key/mathematical behaviours	Marks
• identifies all roads not required	1

Question 6 (c)

Solution



Cycle paths are now 33 km
MC and FR are now needed

Marking key/mathematical behaviours	Marks
• identifies change in length	1
• identifies change of edges	1