**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*, T3=* 0.5 x 2 – 8 = -7 | |
| Marking key/mathematical behaviours | Marks |
| * identifies second term * determines an expression for the third term * calculates third term | 1  1  1 |

**Question 1 (b)**

|  |  |
| --- | --- |
| Solution  *Tn= -4n + 9, n=50* | |
| Marking key/mathematical behaviours | Marks |
| * deduces and expression for the nth term * determines -4 *n* = -200 * determines *n* = 50 | 1  1  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 * travels through each node once only * has no repeated edges | 1  1  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 * expresses the relationship between *e*, *f* and *v* | 1  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 * identifies alternate incorrect starting route | 1  1 |

**Question 3 (a)**

|  |  |
| --- | --- |
| Solution | |
| Marking key/mathematical behaviours | Marks |
| * 10 edges correctly weighted * 15 edges correctly weighted * 10 edges correctly positioned * 15 edges correctly positioned | 1  1  1  1 |

**Question 3 (b)**

|  |  |
| --- | --- |
| Solution  Maximum number of hours is 16  V1 comes on Wednesday  V2 comes on Tuesday  V3 comes on Thursday  V4 comes on Monday | |
| Marking key/mathematical behaviours | Marks |
| * subtracts every number from the maximum number * reduces two rows * reduces further two rows * identifies maximum number of hours * describes allocation of volunteers | 1  1  1  1  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 * explains choice of rule | 1  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 * explains choice of rule | 1  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 * calculates value after one year | 1  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 * identifies the significance of the different amounts transferred * concludes that C is the best option | 1  1  1 |

**Question 5 (a)**

|  |  |
| --- | --- |
| Solution  A  B | |
| Marking key/mathematical behaviours | Marks |
| * plots and labels A * plots and labels B | 1  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 * determines change in the number of successes * interprets the gradient | 1  1  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 * explains positioning on scatter plot | 1  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 * explains the lower correlation coefficient | 1  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 * identifies a further 2 correct roads without any incorrect roads * determines length of cycle paths | 1  1  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 * identifies change of edges | 1  1 |