**MATHEMATICS APPLICATIONS**

**MAWA Semester 1 (Unit 3) Examination 2018**

**Calculator-free**

# Marking Key

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The release date for this exam and marking scheme is

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

**Section One: Calculator-free (50 Marks)**

**Question 1 (a)**

|  |  |
| --- | --- |
| Solution | |
| Marking key/mathematical behaviours | Marks |
| * plots 3 points * plots 2 more points | 1  1 |

**Question 1 (b)**

|  |  |
| --- | --- |
| Solution | |
| Marking key/mathematical behaviours | Marks |
| * identifies correct rate and power * identifies correct format with starting term | 1  1 |

**Question 1 (c)**

|  |  |
| --- | --- |
| Solution  Never. The values keep getting smaller and closer to zero but the values remain positive | |
| Marking key/mathematical behaviours | Marks |
| * identifies the sequence is never negative * provides explanation of sequence behaviour | 1  1 |

**Question 2 (a)**

|  |  |
| --- | --- |
| Solution  The values have been rounded to the nearest tenth. Some loss of accuracy has resulted | |
| Marking key/mathematical behaviours | Marks |
| * indicates numbers are rounded | 1 |

**Question 2 (b)**

|  |  |
| --- | --- |
| Solution  Which party will you vote for at the next election? | |
| Marking key/mathematical behaviours | Marks |
| * identifies an appropriate question for data collection | 1 |

**Question 2 (c)**

|  |  |
| --- | --- |
| Solution    The proportion of people surveyed who supported the Orange party increased over the time of the three surveys. The percentages rose from 36.5 to 39.3 to 41.3 | |
| Marking key/mathematical behaviours | Marks |
| * indicates variables that are related * describes the change in voting percentages over time | 1  1 |

**Question 2 (d)**

|  |  |
| --- | --- |
| Solution  The ages of the voters in all three surveys were comparable.  There were about the same numbers of females and males in each survey  The surveys were conducted in the same regions each time | |
| Marking key/mathematical behaviours | Marks |
| * identifies first condition * identifies second condition | 1  1 |

**Question 2 (e)**

|  |  |
| --- | --- |
| Solution    A column graph  Party along the horizontal axis  Percentages along the vertical axis  A column for each time period (different colours)  A legend for each time period  Titles etc.. | |
| Marking key/mathematical behaviours | Marks |
| * identifies an appropriate type of graph * identifies first graph feature * identifies second graph feature * identifies third graph feature | 1  1  1  1 |

**Question 3 (a)**

|  |  |
| --- | --- |
| Solution  (i) The vertices represent the players  (ii) There are no loops because there are no paths from any vertex to itself  (iii) The graph is a digraph because there are directions on the edges  (iv) Complete | |
| Marking key/mathematical behaviours | Marks |
| * identifies significance of vertices * determines lack of loops * explains lack of loops * explains meaning of digraph * identifies meaning of a complete graph | 1  1  1  1  1 |

**Question 3 (b)**

|  |  |
| --- | --- |
| Solution | |
| Marking key/mathematical behaviours | Marks |
| * presents labelled matrix with size 5 x 5 * leading 0s along the diagonal * other values correct | 1  1  1 |

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**Question 3 (c)**

|  |  |
| --- | --- |
| Solution  Numbers are all 0  Players do not compete against themselves | |
| Marking key/mathematical behaviours | Marks |
| * identifies 0s on leading diagonal * explains why these numbers are 0 | 1  1 |

**Question 3 (d)**

|  |  |
| --- | --- |
| Solution  Mal: By looking for the row where the elements add to the greatest total | |
| Marking key/mathematical behaviours | Marks |
| * identifies the node * explains relevance of greatest sum | 1  1 |

**Question 4 (a)**

|  |  |
| --- | --- |
| Solution  positive | |
| Marking key/mathematical behaviours | Marks |
| * identifies direction of an association | 1 |

**Question 4 (b)**

|  |  |
| --- | --- |
| Solution  15 cents | |
| Marking key/mathematical behaviours | Marks |
| * interprets gradient in equation of a line | 1 |

**Question 4 (c)**

|  |  |
| --- | --- |
| Solution  68.7% | |
| Marking key/mathematical behaviours | Marks |
| * correct interpretation of the coefficient of determination | 1 |

**Question 4 (d)**

|  |  |
| --- | --- |
| Solution  0.8 It is the closest to | |
| Marking key/mathematical behaviours | Marks |
| * identifies closest estimate * identifies relationship between correlation coefficient and coefficient of determination | 1  1 |

**Question 4 (e)**

|  |  |
| --- | --- |
| Solution  *y* = 0.15*x* – 0.7 = 0.15 x 50 – 0.7 = $6.80 | |
| Marking key/mathematical behaviours | Marks |
| * substitutes into given equation * determines subject of formula | 1  1 |

**Question 4 (f)**

|  |  |
| --- | --- |
| Solution  Not very reliable. Prediction is extrapolated beyond the data given. | |
| Marking key/mathematical behaviours | Marks |
| * concludes prediction is not reliable * refers to extrapolation | 1  1 |

**Question 4 (g)**

|  |  |
| --- | --- |
| Solution | |
| Marking key/mathematical behaviours | Marks |
| * plots point on scatter plot | 1 |

**Question 4 (h)**

|  |  |
| --- | --- |
| Solution  decrease | |
| Marking key/mathematical behaviours | Marks |
| * interprets coefficient of determination | 1 |

**Question 5 (a)**

|  |  |
| --- | --- |
| Solution  ELBA = 300 m ELSA = 260 m \*\* shortest path  ERBA = 450 m ELMA = 470 m | |
| Marking key/mathematical behaviours | Marks |
| * names two paths and provides distances * names two more paths and provides distances * identifies shortest path | 1  1  1 |

**Question 5 (b)**

|  |  |
| --- | --- |
| Solution  weighted | |
| Marking key/mathematical behaviours | Marks |
| * identifies that graph is weighted | 1 |

**Question 5 (c)**

|  |  |
| --- | --- |
| Solution  No loops  No multiple paths between nodes | |
| Marking key/mathematical behaviours | Marks |
| * identifies first feature of a simple graph * identifies second feature of a simple graph | 1  1 |

**Question 6 (a)**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Solution   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Years passed | 1 | 2 | 3 | 4 | | Population | 400 | 340 | 274 | 200 | | |
| Marking key/mathematical behaviours | Marks |
| * determines population after 2 years * enters given data | 1  1 |

**Question 6 (b)**

|  |  |
| --- | --- |
| Solution    (i) 100  (ii) increases by 10% each year | |
| Marking key/mathematical behaviours | Marks |
| * interprets fixed value in recurrence relation * interprets rate in recurrence relation | 1  1 |

**Question 6 (c)**

|  |  |
| --- | --- |
| Solution | |
| Marking key/mathematical behaviours | Marks |
| * identifies appropriate recurrence relation | 1 |