**MATHEMATICS APPLICATIONS**

**MAWA Semester 1 (Unit 3) Examination 2017**

**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, 2017**

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

**Question 1**

|  |  |
| --- | --- |
| Solution  Direction is positive – the dots rise as the number of boats nominated increase.  Association is linear, the dots form a pattern around a straight line  Strength is very good – nearly in a straight line | |
| Marking key/mathematical behaviours | Marks |
| * describes direction and justifies * describes form and justifies * describes strength and justifies | 2  2  2 |

**Question 2 (a)**

|  |  |
| --- | --- |
| Solution  2, 5, 12.5 | |
| Marking key/mathematical behaviours | Marks |
| * identifies second term * identifies third term | 1  1 |

**Question 2 (b)**

|  |  |
| --- | --- |
| Solution  30, 10, | |
| Marking key/mathematical behaviours | Marks |
| * identifies first term, second term and identifies third term | 3 |

**Question 2 (c)**

|  |  |
| --- | --- |
| Solution | |
| Marking key/mathematical behaviours | Marks |
| * identifies first term * expresses recursive rule using recursive notation | 1  1 |

**Question 2 (d)**

|  |  |
| --- | --- |
| Solution | |
| Marking key/mathematical behaviours | Marks |
| * uses notation for the general rule with initial term * identifies ratio with power | 1  1 |

**Question 3 (a)**

|  |  |
| --- | --- |
| Solution    4 | |
| Marking key/mathematical behaviours | Marks |
| * identifies degree of nominated vertex | 1 |

**Question 3 (b)**

|  |  |
| --- | --- |
| Solution  RB forms a bridge because the graph would not be connected if RB was removed. | |
| Marking key/mathematical behaviours | Marks |
| * identifies RB as a bridge * explains connectedness of graph changing without the bridge | 1  1 |

**Question 3 (c)**

|  |  |
| --- | --- |
| Solution    BRHTSWMRS | |
| Marking key/mathematical behaviours | Marks |
| * identifies a trail | 1 |

**Question 3 (d)**

|  |  |
| --- | --- |
| Solution | |
| Marking key/mathematical behaviours | Marks |
| * redraws graph in planar form | 1 |

**Question 3 (e)**

|  |  |
| --- | --- |
| Solution  V + f – e = 7 + 3 – 8 = 2 | |
| Marking key/mathematical behaviours | Marks |
| * substitutes into Euler’s rule * uses values for v, f, e to match graph | 1  1 |

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**Question 3 (f)**

|  |  |
| --- | --- |
| Solution  Yes: Nodes can be divided into two groups (RWT and BMSH) and within each group there is no connection and all edges are from a node in one group to a node in another group. | |
| Marking key/mathematical behaviours | Marks |
| * identifies there are 2 groups of nodes hence bipartite * explains why nodes can be formed into groups | 1  1 |

**Question 4 (a)**

|  |  |
| --- | --- |
| Solution  Number of internet users per 100 people in the country | |
| Marking key/mathematical behaviours | Marks |
| * Identifies the response variable | 1 |

**Question 4 (b)**

|  |  |
| --- | --- |
| Solution  0.4 x 200 + 3 = 83 | |
| Marking key/mathematical behaviours | Marks |
| * Determines value of the subject of the formula | 1 |

**Question 4 (c)**

|  |  |
| --- | --- |
| Solution  Not very reliable. Prediction is extrapolated beyond the data given.  At the high end the dots are not very close to the line. (correlation coefficient is less than 0.6) | |
| Marking key/mathematical behaviours | Marks |
| * concludes prediction is not reliable * gives 2 reasons to justify the lack of reliability | 1  2 |

**Question 4 (d)**

|  |  |
| --- | --- |
| Solution  With no mobile phones in the population there are still 3 people per 100 using the internet. | |
| Marking key/mathematical behaviours | Marks |
| * interprets the vertical intercept | 1 |

**Question 4 (e)**

|  |  |
| --- | --- |
| Solution  Positive gradient or rate of change - For every extra mobile phone there is 0.4 extra internet users. (10 for 4) | |
| Marking key/mathematical behaviours | Marks |
| * notes a positive trend * details the rate of change | 1  1 |

**Question 4 (f)**

|  |  |
| --- | --- |
| Solution  There were about 50 less than expected | |
| Marking key/mathematical behaviours | Marks |
| * circles point to match description * estimates difference using line | 1  1 |

**Question 5 (a)**

|  |  |
| --- | --- |
| Solution | |
| Marking key/mathematical behaviours | Marks |
| * determines directed edges for Jon * determines directed edges for Kay * determines directed edges for Min * determines directed edges for Nat | 1  1  1  1 |

**Question 5 (b)**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Solution     |  |  |  |  |  | | --- | --- | --- | --- | --- | | J | K | L | M | N |      |  | | --- | | J | | K | | L | | M | | N | | |
| Marking key/mathematical behaviours | Marks |
| * labels rows and columns * 0 along the leading diagonal * 5 x 5 with only 0 or 1 * 1 for wins * 0 for loss or not player | 1  1  1  1  1 |

**Question 6 (a)**

|  |  |
| --- | --- |
| Solution  Does the use of mobile phones include texting?  IS the time spent parked at the lights included in the driving? | |
| Marking key/mathematical behaviours | Marks |
| * Devises a question to clarify the task | 1 |

**Question 6 (b)**

|  |  |
| --- | --- |
| Solution  Number of calls made your mobile while driving yesterday  Number of texts sent from your mobile while driving last Saturday | |
| Marking key/mathematical behaviours | Marks |
| * identifies two numeric variables relevant to the investigation | 2 |

**Question 6 (c)**

|  |  |
| --- | --- |
| Solution  Observation – watch people driving and see if they are using their phones  Survey – ask drivers  Ask police for the data | |
| Marking key/mathematical behaviours | Marks |
| * identifies 2 ways by which data can be collected. | 2 |

**Question 6 (d)**

|  |  |
| --- | --- |
| Solution  It is not texting that causes the accident but the loss of concentration on the task in hand  It is due to confounding – the other variable (concentration) is affected by the texting | |
| Marking key/mathematical behaviours | Marks |
| * identifies confounding * concludes it is not a causal relationship | 1  1 |