**MATHEMATICS SPECIALIST**

**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 (52 Marks)**

**Question 1(a)**

|  |  |
| --- | --- |
| Solution  ,  and  (i)  (ii)  (iii) | |
| Marking key/mathematical behaviours | Marks |
| (i)   * Determines   (ii)   * Determines and multiplies * Expresses the result in the form   (iii)   * Indicates the need to multiply by * Multiplies this correctly * Re-arranges in the form | 1  1  1  1  1  1 |

**Question 1(a)**

|  |  |
| --- | --- |
| Solution | |
| Marking key/mathematical behaviours | Marks |
| * Correctly plots * Calculates * Correctly plots | 1  1  1 |

**Question 2(a)**

|  |  |
| --- | --- |
| Solution | |
| Marking key/mathematical behaviours | Marks |
| * substitutes the correct exact values into cis * simplifies correctly | 1  1 |

**Question 2(b)**

|  |  |
| --- | --- |
| Solution | |
| Marking key/mathematical behaviours | Marks |
| * applies de Moivre’s theorem * substitutes exact values * simplifies | 1  1  1 |

**Question 2(c)**

|  |  |
| --- | --- |
| Solution  and | |
| Marking key/mathematical behaviours | Marks |
| * Correctly states inequation for half plane above the line * Correctly states the inequality of the circular region * Indicates that it is the intersection of the two regions (ie uses “and”) * Indicates the boundaries correctly by using the appropriate symbol within each inequation | 1  1  1  1 |

**Question 3(a)**

|  |  |
| --- | --- |
| Solution | |
| Marking key/mathematical behaviours | Marks |
| * determines expression * states domain * states range | 1  1  1 |

**Question 3(b)**

|  |  |
| --- | --- |
| Solution | |
| Marking key/mathematical behaviours | Marks |
| * determines expression * states domain * states range | 1  1  1 |

**Question 3(c)**

|  |  |
| --- | --- |
| Solution | |
| Marking key/mathematical behaviours | Marks |
| * rewrites function in turning point form * states range | 1  1 |

**Question 3(d)**

|  |  |
| --- | --- |
| Solution    Restricted domain: | |
| Marking key/mathematical behaviours | Marks |
| * restricts domain correctly * swaps  and * solves for * determines the correct inverse rule | 1  1  1  1 |

**Question 4**

|  |  |
| --- | --- |
| Solution  are asymptotes: | |
| Marking key/mathematical behaviours | Marks |
| * states values of c and d * states value of b * states value of a | 1  1  1 |

**Question 5(a)**

|  |  |
| --- | --- |
| Solution | |
| Marking key/mathematical behaviours | Marks |
| * sketches for * sketches for | 1  1 |

**Question 5(b)**

|  |  |
| --- | --- |
| Solution | |
| Marking key/mathematical behaviours | Marks |
| * sketches for * sketches for | 1  1 |

**Question 5(c)**

|  |  |
| --- | --- |
| Solution | |
| Marking key/mathematical behaviours | Marks |
| * shows two asymptotes * shows  intercept (=0.2) * sketches correctly (shape and accuracy) | 1  1  1+1 |

**Question 6(a)**

|  |  |
| --- | --- |
| Solution | |
| Marking key/mathematical behaviours | Marks |
| * sketch of inverse appears as a reflection in the line * shows correct end-point of (-2,0) and indicates continuation past * sketch has a reasonably accurate shape (ie. crosses at roughly the correct spot) | 1  1  1 |

**Question 6(b)**

|  |  |
| --- | --- |
| Solution  EITHER, uses point of intersection from graph,  OR, solves algebraically, | |
| Marking key/mathematical behaviours | Marks |
| EITHER OR   * uses point of intersection establishes equation to solve * states value near 1.3 states value | 1  1 |

**Question 7(a)**

|  |  |
| --- | --- |
| Solution  So , and back-substitution gives and | |
| Marking key/mathematical behaviours | Marks |
| * systematically eliminates variables * solves for * solves for  and | 1  1  1 |

**Question 7(b)**

|  |  |
| --- | --- |
| Solution  Infinitely many solutions when last equation reduces to ,  i.e. and | |
| Marking key/mathematical behaviours | Marks |
| * systematically eliminates variables * uses the condition for infinitely many solutions * solves for  and | 1  1  1 |