**MATHEMATICS METHODS**

**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)**

**1(a)(i) (2 marks)**

|  |  |
| --- | --- |
| Solution |  |
| Marking key/mathematical behaviours | Marks |
| * correctly differentiates using chain rule
* recognises as
 | 11 |

**Question 1(a)(ii) (2 marks)**

|  |
| --- |
| Solution |
| Marking key/mathematical behaviours | Marks |
| * correctly differentiates using quotient rule
* correctly determines derivative of denominator
 | 11 |

**Question 1(b) (3 marks)**

|  |
| --- |
| Solution  |
| Marking key/mathematical behaviours | Marks |
| * correctly differentiates
* correctly differentiates using chain rule
* correctly evaluates
 | 111 |

**Question 2 (6 marks)**

|  |
| --- |
| Solution when i.e. when In the interval has just one stationary point, which occurs when If then and (3-4-5 right triangle), so If , and if So the minimum value of is indeed  |
| Marking key/mathematical behaviours | Marks |
| * differentiates correctly
* identifies the single stationary point
* evaluates at the stationary point
* checks values of at the end points
* gives correct answer
 | 1+11111 |

**Question 3(a) (2 marks)**

|  |  |
| --- | --- |
|  Solution  (smallest positive solution)So first at rest after seconds  |  |
| Marking key/mathematical behaviours | Marks |
| * obtains
* gives correct answer
 | 11 |

**Question 3(b) (2 marks)**

|  |
| --- |
| Solution when So the initial acceleration is zero. |
| Marking key/mathematical behaviours | Marks |
| * differentiates correctly
* obtains correct answer
 | 11 |

**Question 3(c) (2marks)**

|  |
| --- |
| SolutionSince for all the particle never moves ‘backwards’.So it never returns to its starting point. |
| Marking key/mathematical behaviours | Marks |
| * correct answer
* valid reason
 | 11 |

**Question 3(d) (2 marks)**

|  |
| --- |
| SolutionSince the particle never moves backwards, the distance travelled is m. |
| Marking key/mathematical behaviours | Marks |
| * obtains distance travelled as the integral of
* evaluates integral correctly
 | 11 |

**Question 4(a) (5 marks)**

|  |  |
| --- | --- |
| SolutionThe shaded area = area of the square – area of the quarter circle – area of the triangle Hence the probability, of a dart landing within the shaded area is,  |  |
| Marking key/mathematical behaviours | Marks |
| * States how the shaded area may be calculated (line 1 of solution)
* Calculates at least one of the areas of the required regions
* Determines the shaded area in terms of
* States the probability as a ratio of the total area
* Simplifies to the required result
 | 11111 |

**Question 4(b) (2 marks)**

|  |
| --- |
| Solution  |
| Marking key/mathematical behaviours | Marks |
| * Uses the result from part (a) to determine
* Applies the multiplication principle correctly
 | 11 |

**Question 4(c) (2 marks)**

|  |
| --- |
| SolutionProbability Jamie hits the green region only once in three throws  |
| Marking key/mathematical behaviours | Marks |
| * States the three ways that this can happen
* Applies the addition principle and determines the correct result
 | 11 |

**Question 4(d) (2 marks)**

|  |
| --- |
| SolutionProbability Jamie hits the green region at least once in three throws  |
| Marking key/mathematical behaviours | Marks |
| * Recognises the compliment
* States the correct result
 | 11 |

**Question 5(a)** **(2 marks)**

|  |
| --- |
| Solution =  |
| Marking key/mathematical behaviours | Marks |
| * correctly integrates each term
* correctly adds constant of integration (1 mark penalty once only throughout the rest of question 5)
 | 11 |

**Question 5(b) (2 marks)**

|  |
| --- |
| Solution =  = + c |
| Marking key/mathematical behaviours | Marks |
| * correctly simplifies integral
* correctly integrates each term
 | 11 |

**Question 5(c) (2 marks)**

|  |
| --- |
| Solution =  =  |
| Marking key/mathematical behaviours | Marks |
| * recognises the rule
* correctly integrates
 | 11 |

**Question 5(d) (2 marks)**

|  |
| --- |
| Solution =  |
| Marking key/mathematical behaviours | Marks |
| * correctly integrates first term
* correctly integrates second term
 | 11 |

**Question 6 (4 marks)**

|  |
| --- |
|  Solution  =  =  |
| Marking key/mathematical behaviours | Marks |
| * correctly manipulates the expansion to express in terms of cos(2x)
* correctly integrates each part

  | 22 |

**Question 7(a) (2 marks)**

|  |
| --- |
| Solution =  =  =  = -1 |
| Marking key/mathematical behaviours | Marks |
| * correctly integrates
* correctly evaluates
 | 11 |

**Question 7(b) (2 marks)**

|  |
| --- |
| Solution =  =   |
| Marking key/mathematical behaviours | Marks |
| * indicates the change of limits
* correctly applies fundamental theorem
 | 11 |

**Question 7(c)** **(2 marks)**

|  |
| --- |
| Solution =  =  =  =  |
| Marking key/mathematical behaviours | Marks |
| * correctly integrates
* correctly evaluates
 | 11 |