| **Question** | **Scheme** | | | **Marks** |
| --- | --- | --- | --- | --- |
| **1(a)** |  | | | M1 A1 |
|  |  | | | **(2)** |
| **1(b)** | f(5) = –0.0807 | | | B1  M1 |
|  | | | M1 |
| = 5.2(0) | | | A1 |
|  |  | | | **(4)** |
|  |  | | | **(6 marks)** |
| **2(a)** |  | | |  |
|  | | |  |
|  | At least two of the four terms differentiated correctly. | | M1 |
|  | Correct differentiation. (Allow any correct unsimplified form) | | A1 |
|  | | |  |
|  |  | | | **(2)** |
| **2(b)** |  | | A correct numerical expression for f(0.8) | B1 |
|  | Attempt to insert *x* = 0.8 into their f’(*x*). Does not require an evaluation.  (If is incorrect for their derivative and there is no working score M0) | | M1 |
|  | Correct application of Newton-Raphson using their values. Does not require an evaluation. | | M1 |
|  |  | |  |
|  | 0.869 | | A1 cao |
|  |  | | | **(4)** |
|  |  | | | **(6 marks)** |
| **3** |  | | |  |
|  | | | M1A1 |
|  | | | B1 |
|  | | | M1 |
|  | | | M1 |
|  | | |  |
|  | | | A1 **cao** |
|  |  | | | **(6 marks)** |
| **4(a)** |  | | |  |
|  | | | M1 |
| **Sign change** (and is continuous) therefore **a root / α** is between  and | | | A1 |
|  |  | | | **(2)** |
| **4(b)** |  | | | M1A1 |
|  |  | | | **(2)** |
| **4(c)** |  | | | M1 |
|  | | | M1 |
|  | | | A1 |
|  |  | | | **(3)** |
|  |  | | | **(7 marks)** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Source paper** | **Question number** | **New spec references** | **Question description** | **New AOs** |
| 1 | FP1 Jan 2013 | 3 | 9.2 | Newton-Raphson method | 11.1.2, 12.1 |
| 2 | FP1 June 2011 | 4 | 9.2 | Newton-Raphson method | 11.1.2, 12.1 |
| 3 | FP1 June 2012 | 3 | 9.2 | Newton-Raphson method | 11.1.2, 12.1 |
| 4 | FP1 June 2014 | 2 | 9.2 | Newton-Raphson method | 11.1.2, 12.1 |