Cape Unit 2 Paper 2

2013 Solutions

1. (a) 

 

 But, hence the gradient is undefined at (1, 0). [vertical tangent]

 OR

 

 

 

 

 But, hence the gradient is undefined at (1, 0).

 (b) 

 

 

 

 (c) 

 

 

 

 

 

 (d) (i) 

 

 

 

 (ii) 

 

 

 

2. (a) (i) 

 

 

 

 OR

 

 

 

 

 

 

 

 

 

 

 OR

 

 

 

 (ii) 

 

 OR

 

 

 (b) (i) 

 the ordinates are 

 Area

 square units

 (c) (i) 

 

 coeff;

 coeff ; 

 coeff;

 constant 

 

 OR

 

 

 

 

 (ii) 

 

 

 

 

 

 

 

3. (a) , 

 Let be the proposition that 

 At , , so is true

 Assume that is true for some  i.e. 

 Let 

 Since is true, we have

 

 and 

 Hence and follows, is true for all 

 (b) (i) (a) 

 

 

 (b) 

 

 

 (ii) 

 

 (c) (i) 

 

 

 

 

 (ii) 

 

4. (a) (i) 

 

 

 (ii) 

 

 

 

 (b) 

 

 

 

 the coefficient of the term is multiply the two RHS

 

 

 OR

 let the coefficient of 

 

  

 

 OR

  

  occurs when  coeff of 

 

 (c) (i) at 

 is continuous

 by the IVT there is a root within 

 (ii)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *n* | *an* | *bn* | *Pn* | *f*(*Pn*) |
| 4 | 2.875 | 3 | 2.9375 | 0.347>0 |
| 5 | 2.875 | 2.9375 | 2.9063 |  - 0.0517<0 |
| 6 | 2.9063 | 2.9375 | 2.9291 |  - 0.543 < 0 |
| 7 | 2.9219 | 2.9375 | 2.9297 | 0.146 > 0 |
| 8 | 2.9219 | 2.9279 | 2.9258 | 0.045 > 0 |

 Let 

5. (a)

*V*



*V*





*C*



*V*





*C*

*V*



*C*















*C*

*C*

*V*

*V*

*C*

*V*

*C*

(b) (i) 

 

 The system is not consistent since the third row is 0 0 0 = 9

 (ii) 

 

 Solution is unique since only the leading diagonal elements

 are non-zero and equal to 1.

 Solve for *x*, *y*, *z*.

 (c) (i) 

 

 

 

 (ii) 

 

 

6. (a) (i) 

 

 

 

 

 

 (ii) 

 

 

 

 (b) 

 (i) (a) 

 

 

 (b) 

 (ii) 

 

 

 

 

 

 (iii) 

 

 

 

 

 

 

 Particular solution

 