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| EGC_Black | Student Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **Eastern Goldfields College**  Mathematics Specialist Unit 3 2016  **Investigation 1 - Complex numbers using *eiθ***  **Total Marks: 41 Time Allowed: 45** |

**Question 1** **(13 marks)**

Given







(a) show that

(i) , (4)

(ii) . (2)

Hence,

(b) determine expressions for and for  in terms of ,

(3)

(c) solve

(i) , (2)

(ii) . (2)

**Question 2**  **(11 marks)**

Given  is the exponential form of the complex number , where  and ,

(a) express  in exponential form, (2)

(b) express  in exponential form, (2)

(c) express  in Cartesian form. (2)

(d) Hence, express in Cartesian form. (5)

**Question 3**  **(17 marks)**

The hyperbolic trigonometric functions  and  are defined by



(a) Show that

(i)  (2)

(ii)  (1)

(iii) . (2)

(b) Express  in terms of  and . (3)

(c) Show that  and determine an expression for in terms of .

(3)

(d) Write  and  in terms of the hyperbolic functions. (3)

(e) Express  in Cartesian form. (3)

**End of questions**