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**CHURCHLANDS SENIOR HIGH SCHOOL**

**MATHEMATICS SPECIALIST 3, 4 TEST ONE 2017**

**NON-Calculator Section**

**Chapters 1, 2,**

**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Time: 50 minutes**

**Total: 49 marks**

1.[12 marks: 3,3,3,3]

Describe and sketch each of the following subsets of the complex plane.

a)



Description :

b)



Description:

c)



Description:

d)



Description:

2. [ 6 marks: 2,1,1,1,1]

Sketch on the complex plane below the region defined by





Hence, find

i) the maximum value of

ii) the minimum value of

iii) the maximum value of Re(z)

iv) the minimum value of Im(z)

3. [7marks: 1,2,4]

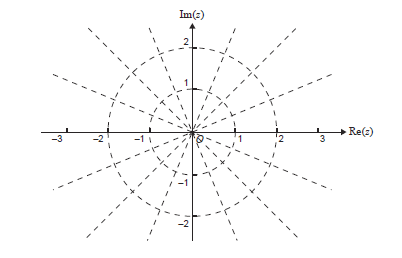
i) Find the remainder when is divided by .

ii) When is divided by , the remainder is 30. Find c.

iii) When is divided by , the remainder is 15. If is a factor of the given polynomial, find the values of and .

4. [2 marks]

Plot the roots of on the Argand diagram below.



5. [4 marks:1,2,1]

Let .

i) Express in polar form.

ii) Express in polar form.

iii) Hence express in the form .

6. [12 marks:3, 3, 6 marks]

(a) If and , prove that:

b) Simplify giving your answer in the form .

c)

Find all , given that

7. [6 marks]

If and by using De Moivre’s theorem together with knowledge of the binomial expansion to find , show that and .