**Specialist Mathematics Units 3 & 4**

**Test 1 2017**

**Calculator Free Section**

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Score: \_\_\_\_\_ / 22**

**Section 1 is worth approximately 42% of your final test mark.**

**No calculators or notes are to be used.**

**Access to approved Mathematics Specialist formulae sheet is permitted.**

**Simplify answers where possible. Time limit = 25 minutes.**

**1. [4 marks: 3, 1]**

a) On the axes below, draw the graphs of  and  , for  .



b) Write down the coordinates of the point where the graphs intersect.

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

a) Sketch  on the Argand diagram.

Identify important features.

.   
  
  
b) Sketch the region of the complex plane defined by (4 marks)  
  
 {z:   1<  <2} Identify important features.



**3. [6 marks: 1, 1, 1, 3 ]**

The complex numbers of *z* and *w* are such that:

*z* = 2 + 5i and *w* = 4 – 3i.

Express each of the following in the form a + bi.

**a)**  **b)** 

**c)**  **d)** 

**4. [5 marks ]**

Factorise the polynomial *.*

**Specialist Mathematics Units 3 & 4**

**Test 1 2017**

**Calculator Section**

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Score: \_\_\_\_\_ / 31**

**Section 2 is worth 58% of your final test mark.**

**Calculators allowed and 1 page of A4 notes, writing on both sides.**

**Access to approved Mathematics Specialist formulae sheet is permitted. Time limit = 30 minutes**

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

Use De Moivre’s Theorem to find the exact value in polar form of

**a)  b) **

**6. [5 marks ]**

By finding  if , show that 

**7. [3 marks ]**

If  and  are two of the four, fourth roots of .

Find, exactly, all values of *A* and , where , for the four roots.

**8. [7 marks: 2, 1, 4 ]**

For , a complex number where ;

a) Show that 

b) Hence, or otherwise, show that 

c) Hence show that 

**9. [4 marks ]**

 leaves a remainder of -7 when divided by , and 129 when divided by . Find  and , given that 

**10. [8 marks ]**

 is a root of , where and are real. Determine and and the other roots of the equation.