Complex Numbers – 2022 GCE AS Pure Further Mathematics A

1. June/2022/Paper_Y531/01/No.5

In this question you must show detailed reasoning.

(a) Use an algebraic method to find the square roots of $-16 + 30\mathrm{i}$. **[5]**

(b) By finding the cube of one of your answers to part **(a)** determine a cube root of $\frac{-99+5\mathrm{i}}{4}$.

Give your answer in the form $a + b\mathrm{i}$. **[2]**

2. June/2022/Paper_Y531/01/No.7

In this question you must show detailed reasoning.

Two loci, C_1 and C_2, are defined as follows.

$$C_1 = \left\{z : \arg(z+2-\mathrm{i}) = \frac{1}{4}\pi\right\} \text{ and } C_2 = \left\{z : \arg(z-2-\sqrt{3}-2\mathrm{i}) = \frac{2}{3}\pi\right\}$$

By considering the representations of C_1 and C_2 on an Argand diagram, determine the locus $C_1 \cap C_2$. **[7]**