**Complex number 2**

**1.** Given , and , find .

Write your answer in the standard form of .

Hence, find the modulus and principal argument of .

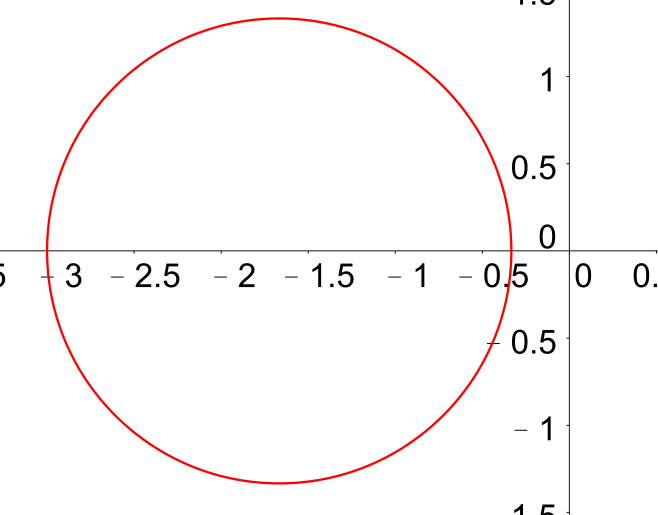
State your answers correct to three decimal places.

(to 3 dec.places)

(to 3 dec.places)

**2.** Given that , find the Cartesian equation of the locus of the point P representing complex number z. .

Hence, sketch the locus of the point P on an Argand diagram.



Let

Locus is a circle centre = ,

radius =

**3.** Solve the equation .

By de Moirves’ Theorem,

**4.** If the equation has a root where are real numbers, find the values of . Show that is also a root of the equation.

The equation becomes

Since is also a root of the equation.

**5.** **(a)** One of the roots of the equation is an integer. Find this root and write down a quadratic equation for the remaining roots. Find these roots, expressing your answer in the satandard form of .

**(b)** By writing , find the roots of the equation ,

giving the complex roots in the form .

**(a)** is a factor of .

By division, we have

.

**(b)**

**6.** Find the roots of the equation , where is a real constant.

**(a)** Show that the points representing the roots of the above equation form an equilateral triangle.

**(b)** Solve the equation .

**(c)** If is a root of the equation , where and , show that the conjugate is also a root of this equation.

**(d)** Hence, or otherwise, obtain a polynomial equation of degree six with three of its roots also the roots of the equation

**(a)**

.

.

Thus the points representing the roots of the above equation form an equilateral triangle.

**(b)**

By (a),

**(c)** If is a root of the equation , then

, since

is also a root of this equation.

**Alternatively**, we can set

Thus, is also a root of the equation.

**(d) Method 1 (More complicate, but it satisfies the former part of quadratics)**

Replace by 1 in part (a), the roots of are

**,**  **,**

Their conjugates are , ,

Hence, the required polynomial equation of degree six is

,

which is the product of three quadratics:

**Method 2 (faster, but it does not use the former part of quadratics)**

However, we you simply find a polynomial equation of degree six with real coefficients.

Consider ,

which obviously has the roots of the equation .

(note that the conjugates are also roots)

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