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1st Year License
Geology
Mathematics 01

Série of T.D N ° 2 (S1)

Exercice 1

1. Give the algebraic writing of the complex numbers below :

a. $z_1=\dfrac{1+i}{i}$ **b.** $z_2=\dfrac{1}{1-i}$ **c.** $z_3=\dfrac{-2+i}{2+i}$

2. We consider the two complex numbers z_1 and z_2 defined by :

$$z_1=1+i \quad \text{et} \quad z_2=5-2i$$

Determine the algebraic writing of the following numbers:

a. z_1+z_2 **b.** z_1-z_2 **c.** z_1-2z_2

d. $z_1\times z_2$ **e.** $\dfrac{z_1}{z_2}$ **f.** $\dfrac{z_2}{z_1-z_2}$

Exercice 2

Write in algebraic form : $z_1=\dfrac{7+i}{3-2i}$ $z_2=\dfrac{-3}{(1+i)(2-i)}$

Exercice 3

Determine the conjugate of the following complex number and write it in algebraic form

$$z_1=\frac{2+i}{1-2i}$$

Exercice 4

Calculate the modulus of each of the given complex numbers :

1. $z_1=1+3i$ **2.** $z_2=3-4i$

3. $z_3=-1+7i$ **4.** $z_4=-5-3i$

Exercice 5

Solve in $\mathbb{C}$ the following equations :

a. $3z+iz=0$ **b.** $z+2iz=i$ **c.** $z+2-i(z+1)=0$

d. $\dfrac{z-5}{z-i}=i$ **e.** $2iz-3=z+1$ **f.** $3z-5+2iz=2i-3z+4iz$

Exercice 6

Solve the following quadratic equations :

1. $2z^2-6z+5=0$ **2.** $z^2+z+1=0$ **3.** $z^2-5z+9=0$

4. $z^2-3z+4=0$ **5.** $z^2-z+10=0$ **6.** $z^2-4z-1=0$

Exercice 7

Determine an argument of each of the given complex numbers :

1. $z_1=-1+i$ **3.** $z_3=\sqrt{6}+i\sqrt{2}$

2. $z_2=i$ **4.** $z_4=(2+2i)(1-i)$

Exercice 8

The complex plane is related to a direct orthonormal reference frame $O,\vec{u},\vec{v}$.

We designate by A, B, C and G the points of the plane of respective affixes $z_A=-1$, $z_B=2+i\sqrt{3}$, $z_C=2-i\sqrt{3}$ et $z_G=3$.

a. Create a figure and place points A, B, C and G.

b. Calculate the distances AB, BC and AC. Deduce the nature of triangle ABC.

c. Calculate an argument of the complex number

$$\frac{z_A-z_C}{z_G-z_C}$$

Deduce the nature of the triangle GAC.

Exercice 9

Write the following numbers in exponential form:

$$z_1=\left(3+i\sqrt{3}\right)^4 \qquad z_2=\frac{1+i\sqrt{3}}{\sqrt{3}-i} \qquad z_3=\frac{\sin\frac{\pi}{12}-i\cos\frac{\pi}{12}}{\cos\frac{\pi}{12}+i\sin\frac{\pi}{12}}$$

Exercice 10

We consider the complex number $a=\left(-\sqrt{3}+i\right)^{2013}$.

1) Determine the exponential form of: $-\sqrt{3}+i$

2) Show that a is pure imaginary.