دورة سنة 2005 الاستثنائية	امتحانات الشهادة الثانوية العامة فرع علوم الحياة	وزارة التربية والتعليم العالي المديرية العامة للتربية دائرة الامتحانات
الاسم: الرقم:	مسابقة في مادة الرياضيات المدة: ساعتان	عدد المسائل : أربع

ملاحظــة : يُسمح باستعمال آلة حاسبة غير قابلة للبرمجة أو اختزان المعلومات أو رسم البيانات.
يستطيع المرشح الإجابة بالترتيب الذي يناسبه (دون الالتزام بترتيب المسائل الوارد في المسابقة)

I- (4 points)

In the complex plane referred to a direct orthonormal system $(O\,;\,\vec{u}\,,\,\vec{v})$, consider the points E and F of affixes $z_E = \frac{\sqrt{3}+1}{4} - \frac{\sqrt{3}-1}{4}i$ and $z_F = \frac{1}{2} + \frac{1}{2}i$.

1) a- Calculate $(z_E)^2$ and find the modulus and an argument of $(z_E)^2$.

b- Determine the modulus of z_E and verify that $-\frac{\pi}{12}$ is an argument of z_E.

c- Deduce the exact values of $\cos\frac{\pi}{12}$ and $\sin\frac{\pi}{12}$.

2) Let $Z = \frac{z_E}{z_F}$.

a- Write z_E, z_F and Z in the exponential form.

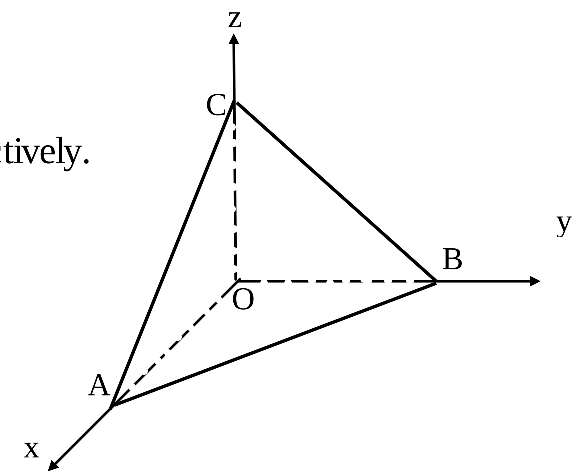
b- Show that the triangle OEF is equilateral.

II- (4 points)

In the space referred to a direct orthonormal system $(O\,;\,\vec{i}\,,\,\vec{j}\,,\,\vec{k})$, consider the points A (4 ; 0 ; 0) , B (0 ; 4 ; 0) and C (0 ; 0 ; 4).

1) Write an equation of plane (ABC).

2) Calculate the area of triangle ABC.



3) Let F and G be the midpoints of [AC] and [BC] respectively.

a- Give a system of parametric equations of the straight line (FG).

b- The plane of equation z = 0 intersects the plane (OFG) along a line (d). Prove that the lines (d) and (FG) are parallel to each other.

c- Calculate the distance between the two lines (d) and (AB) .

III- (4 points)

The 80 students of the third secondary classes in a certain school are distributed into the three sections GS , LS and SE as shown in the following table :

	GS	LS	SE
Girls	8	18	10
Boys	12	14	18

The school director chooses randomly a group of 3 students, from the third secondary classes, to participate in a TV program.

1) What is the number of possible groups?
2) Designate by X the random variable that is equal to the number of boys in the chosen group. Determine the probability distribution of X .
3) Show that the probability that the chosen group contains one girl from each section is $\frac{18}{1027}$.
4) The chosen group is made up of 3 girls, What is the probability that they are from the same section ?

IV- (8 points)

Let f be the function that is defined on IR by : $f(x) = x + 2 - e^{-x}$, and (C) be its representative curve in an orthonormal system $(O ; \vec{i} , \vec{j})$.

1) a- Calculate $\lim\limits_{x \to +\infty} f(x)$ and prove that the line (d) of equation $y = x + 2$ is an asymptote of (C).
   b- Calculate $\lim\limits_{x \to -\infty} f(x)$ and give, in the decimal form, the values of $f(-1.5)$ and $f(-2)$.
2) Calculate $f'(x)$ and set up the table of variations of f.
3) Write an equation of the line (T) that is tangent to (C) at the point A of abscissa 0.
4) Show that the equation $f(x) = 0$ has a unique root α and verify that $-0.5 < \alpha < -0.4$.
5) Draw (d), (T) and (C) .
6) Designate by g the inverse function of f, on IR.
   a- Draw, in the system $(O ; \vec{i} , \vec{j})$, the curve (G) that represents g.
   b- Designate by $A(\alpha)$ the area of the region that is bounded by the curve (C) , the axis of abscissas and the two lines of equations $x = \alpha$ and $x = 0$.
   Show that $A(\alpha) = (-\frac{\alpha^2}{2} - 3\alpha - 1)$ units of area.
   c- Deduce the area of the region that is bounded by the curve (G), the axis of abscissas and the two lines of equations $x = 0$ and $x = 1$.