

دورة سنة 2008 العادية	امتحانات الشهادة الثانوية العامة الفرع : علوم الحياة	وزارة التربية والتعليم العالي المديرية العامة للتربية دائرة الامتحانات
الاسم: الرقم:	مسابقة في مادة الرياضيات المدة: ساعتان	عدد المسائل: اربع

ملاحظة: - يسمح باستعمال آلة حاسبة غير قابلة للبرمجة أو اختزان المعلومات أو رسم البيانات
- يستطیع المرشح الإجابة بالترتيب الذي يناسبه (دون الالتزام بترتيب المسائل الواردة في المسابقة) .

I- (4 points)

In the complex plane (P) referred to an orthonormal system (O; \vec{u}, \vec{v}), consider the points

A, B and C of affixes $a = \sqrt{3} - i$, $b = \sqrt{3} + i$ and $c = 2i$ respectively.

- 1) Show that the three points A, B and C are on the same circle with center O.
- 2) Write $\frac{c-b}{a-b}$ in the algebraic and in the exponential forms.
- 3) Let M be a point other than O, of affix $z = x + iy$, in the plane (P); (x and y are real numbers).

$$\text{Let } Z = \frac{z-b}{z}.$$

- a- Determine the set (E) of points M such that $|Z|=1$.
- b- Verify that A and C belong to (E).
- c- Determine the set (F) of points M such that Z is pure imaginary.

II- (4 points)

To encourage national tourism, a tourist agency proposes week-ends of two days, and offers its customers three choices:

- Full-board week-end
- Half-board week-end
- Luxury week-end.

The agency published the following advertisement:

Choice \ Destination	Full-board	Half-board	Luxury
Mountain	150 000 LL	100 000 LL	200 000 LL
Beach	100 000 LL	75 000 LL	150 000 LL

This agency estimates that 65% of its customers choose mountains, and the others choose the beach; and that out of the customers to any destination 55% choose full-board and 30% choose half-board while the others choose luxury week-ends.

A customer is chosen at random and is interviewed.

Consider the following events:

- A : « the interviewed customer has chosen the mountains ».
- B : « the interviewed customer has chosen the beach ».
- C : « the interviewed customer has chosen full-board week-end ».
- D : « the interviewed customer has chosen half-board week-end ».
- S : « the interviewed customer has chosen the luxury week-end ».

- 1) a- Calculate the following probabilities: $P(A \cap C)$, $P(B \cap C)$ and $P(C)$.
 b- The interviewed customer had chosen full-board, what is the probability that he chose the beach?
- 2) Let X be the random variable that is equal to the amount paid to the agency by a customer.
 - a- Show that $P(X=150\,000) = 0.41$ and determine the probability distribution for X .
 - b- Calculate the mean(expected value) $E(X)$. What does the number thus obtained represent?
 - c- Estimate the sum received by this agency when it serves 200 customers.

III- (4 points)

In the space referred to a direct orthonormal system $(O ; \vec{i}, \vec{j}, \vec{k})$, consider the points $A(1; 2; 0)$, $B(2; 1; 3)$, $C(3; 3; 1)$, $D(5; -3; -3)$ and $E(-3; 7; 3)$.

- 1) Find an equation of the plane (P) determined by A, B and C.
- 2) Find a system of parametric equations of line (DE).
- 3) Prove that (P) is the mediator plane of [DE].
- 4) Prove that (BC) is orthogonal to (DE).
- 5) a- Calculate the area of triangle BCD.
 b- Calculate the volume of tetrahedron ABCD, and deduce the distance from A to plane BCD.

IV- (8 points)

Let f be the function defined on \mathbb{R} by $f(x) = (x - 1)e^x + 1$ and designate by (C) its representative curve in an orthonormal system $(O ; \vec{i}, \vec{j})$.

- 1) a- Calculate $\lim_{x \rightarrow -\infty} f(x)$ and deduce an asymptote (d) of (C).
 b- Study, according to the values of x , the relative positions of (C) and (d).
 c- Calculate $\lim_{x \rightarrow +\infty} f(x)$ and find $f(2)$ in decimal form.
- 2) Calculate $f'(x)$ and set up the table of variations of f .
- 3) Prove that the curve (C) has a point of inflection W whose coordinates are to be determined.
- 4) a- Draw (d) and (C).
 b- Discuss graphically, according to the values of the real parameter m , the number of solutions of the equation $(m - 1)e^{-x} = x - 1$.
- 5) Calculate the area of the region bounded by (C), the axis of abscissas and the two lines of equations $x = 0$ and $x = 1$.
- 6) a- Show that the function f has on $[0; +\infty[$ an inverse function g and draw (G), the representative curve of g in the system $(O ; \vec{i}, \vec{j})$.
 b- Find the area of the region bounded by (G), the axis of ordinates and the line (d).