



UNIVERSITY OF YAOUNDÉ
ÉCOLE NORMALE SUPÉRIEURE ANNEXE DE BAMBILI

COMMON ENTRANCE EXAMINATION JULY 2009 SESSION

CYCLE: 1

CAMPUS: Annexe Bambili

SERIES: GCE AL; Bac C, D, E

GENERAL EDUCATION ☐

TECHNICAL EDUCATION ☒

PAPER: Mathematics

DURATION: 03 hrs

COEFFICIENT: 4

EXERCISE I: 06 pts

Let (E) be the following equation: $X^3 - 15X - 4 = 0$.

- 1) Verify using the graph that (E) has three real roots.
- 2) Show that if u and v are two numbers such that $u^3 + v^3 = 4$ and $uv = 5$ then $u + v$ is a root of (E).
- 3) Prove that u^3 and v^3 are solution of $x^2 - 4x + 125 = 0$.
Does this latest equation admit real roots?
Solve it in the field of complex numbers $\mathbb{C}$.
- 4) Compute $(2 + i)^3$ and $(2 - i)^3$.
Deduce the roots of (E).

EXERCISE II: 04 pts

Let A_1 and A_2 be two sets of bowls. We assume that A_1 contains 75 % of white bowls while A_2 contains 50 % of them. Furthermore the numbers of bowls in A_1 is three times that of A_2 . One puts all the bowls of A_1 and A_2 into an urn and takes out a bowl at random. One observes that the bowl is white. What is the probability that it is from A_1 , from A_2 ?

EXERCISE III: 10 pts

Let function f be defined on $\mathbb{R}$ by:
$$f(x) = \begin{cases} x - 1 + \frac{1}{x}, & x \leq 1 \\ 1 - (\ln(x))^2, & x > 1 \end{cases}$$

Part A

- 1) Show that f is continuous and derivable at 1.
- 2) Compute the limits of f at the boundary of its domain and give the infinite branches of the representative curve of f .
- 3) Study the variations of f .
Prove that the point $(e, f(e))$ is an inflexion point to the curve of f .
- 4) Draw the curve of f .

Part B

Let h be the restriction of f on open interval $]1, +\infty[$.

- 1) Show that h is a bijection of $]1, +\infty[$ onto an interval to specify.
- 2) Deduce that h has an inverse h^{-1} and then precise its variations.
Draw the curve h^{-1} .