ENSET BAMENDA

MATHS PAST QUESTIONS AND SOUGTIONS

ENGINEERS



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Mathematics

Civil Engineering (BAC C, D, E; GCE A/L) 2009-2010

Exercise (10 marks)

Given any real, we consider functions f_a defined on $]0; +\infty[$ by $f_a(x) = x^{ax}$.

- 1. Determine the limit of the function f_a in 0.
- 2. Determine, according to the values of *a*, the limit of function f_a in $+\infty$.
- 3. Prove that if $a \neq 0$, function f_a has extremum. Draw two tables of variations according to the value of *a*. Calculate the coordinates of points M_a of the curve corresponding to that extremism.
- 4. What is the set *E* of point M_a when *a* describes \mathbb{R}^* ?
- 5. In an orthonormal line, draw (O, i, j) (graphic unit 3 cm). Curves C_1 , C_2 , C_3 and C_4 representing function f_a for *a* having respectively value: 2, 0.5, -2, and -0.5. Set *E* shall equally be represented.

Exercise (5 marks)

In the complex plane with an orthonormal line, we consider the point $(A_n)_{n \in \mathbb{N}}$ affixes Z_n defined by: $Z_{n+1} = \frac{1+i\sqrt{3}}{3}Z_n$ and $Z_0 = 4$.

- 1. Determine the algebraic forms of Z_1 , Z_2 , Z_3 and Z_4 position point A_1 , A_2 , A_3 and A_4 .
- 2. We intend to calculate the length l_n of the polygonal line $A_0, A_1, ..., A_n$.

We write $d_n = |Z_{n+1} - Z_n|$. Prove that $(d_n)_{n \in \mathbb{N}}$ is a geometric series, this reason and the first term of which shall be determined. Prove that $l_n = 4\sqrt{7}[1 - (\frac{2}{3})^n]$. Determine the limit l_n when *n* turns toward infinity.

Exercise (5 marks)

A produce of sweets has three machines A, B and C which provides respectively 10%, 40% and 50% of his factories outputs. A study reveal that the percentage of defective sweet stands at 3.5% for machine A, 1.5% for machine B and 2.2% for machine C. after being produced, the sweets are poured in a tray, which is common to three machines. We choose a sweet at random.

1. Prove that the probability that the sweet is from machine *A* and its defective (faulty) is 0.011.

- 2. Calcule the probability that the sweet is defective.
- 3. Calcule the probability that the sweet is from machine *C* knowing that it is defective.
- 4. We pick 10 sweet successively from the tray and put them back. Calcule the probability to have at least one defective sweet from the 10 samplings.

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