

UNIVERSITY OF BAMENDA

ECOLE NORMALE SUPERIEUR ANNEXE DE BAMBILI

COMMON ENTRANCE EXAMINATION JULY 2009

SECOND CYCLE TECHNICAL EDUCATION 3HOURS

PAPER: APPLIED MATHEMATICS (MINOR ) FOR ALL ENGINEERING

EXERCISE 16Pts

Let  $f$  the endomorphism of vectorial space  $E$  basic  $B = (I, j, k)$  defined by  
 $f(i) = j + 2k$ ;  $f(j) = 2j + 4k$  and  $f(k) = 4i + j - 2k$

1. Determine the characteristics polynomial of  $f$
2. Show that the endomorphism  $f$  can be diagonalized and do it
3. Give the passage matrix  $p$  from basic  $B$  to the basic  $B_0$  of Eigen vector  
what formula show the relationship between matrix  $A$  of  $f$  according to  
basic  $B_0$  ?
4. Compute the reverse matrix  $P^{-1}$
5. Compute the matrix  $D^{-7}$
6. Solve the systems differential equations

$$\begin{cases} \frac{dy}{dt} = 4z \\ \frac{dy}{dt} = x + 2y + z \\ \frac{dz}{dt} = 2x + 4y - 2z \end{cases}$$

**EXERCISE 2: 5pts**

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Let us consider the function  $f(x)$  of real  $x$  of period  $2\pi$  defined in the interval  $-\pi \leq x \leq \pi$  by  $x^2 - \pi^2$

1. Compute the sum of the Fourier series. Study the convergent ( justify your answer )
2. Deduce the sum of convergent series

$$\sum_1^{\infty} \frac{1}{n^2} ; \quad \sum_1^{\infty} \frac{(-1)^n}{n^2}$$

**EXERCISES 3 6pts**

One considers the following picture giving the seilling price of y (in  $10^5$  francs) of a second-hand vehicle according to its x age (in years)

Age	1	2	3	4	5	6	7	8	
price	2.50	1.70	1.20	1.10	0.90	0.80	0.78	0.40	

One pose  $U = \log(x)$  (log means common logarithm) the calculation will be done from the values approximate to  $10^4$  close to the common logarithms

1. Calculates the linear interrelationship coefficient between U and Y
2. Determine an equation of the regression right of Y in U ( the sense of the root mean square )
3. Give an evaluation of the car price of 10 years age

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