Ecole Internationale PACA
à Manosque
Tle ES

TEST N°6
MARCH 8TH 2013

EXERCISE 1 (4.5 PTS)

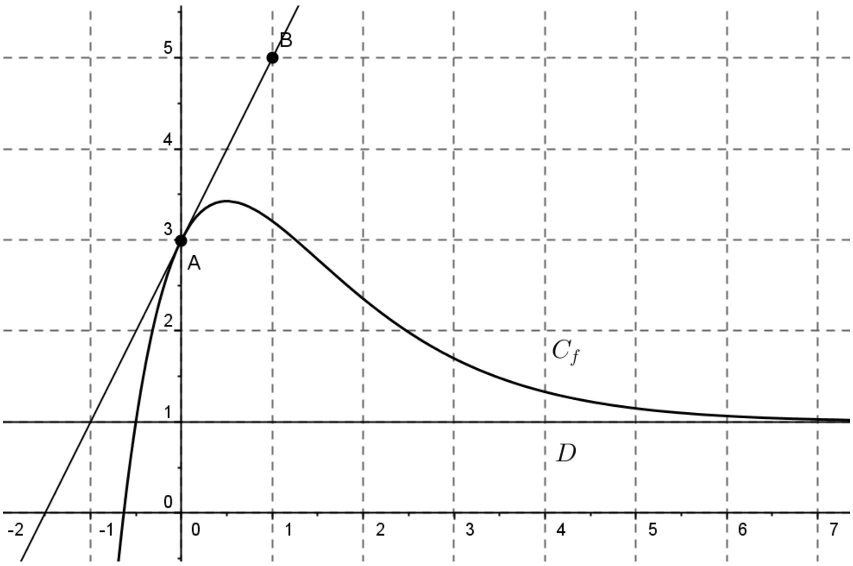
1. Calculate the following integrals : a. $\int_1^2 \left(1-\frac{1}{t^2}\right)dt$ b. $\int_0^{\ln 2} e^x - x \; dx$

2. Work out the mean value of the square function between -1 and 1.

EXERCISE 2 (8 PTS) BAC ES PONDICHERY 04/2011

The graph C_f drawn opposite is the one of a function f defined and differentiable on ℝ. We denote f' the derivative of f.

- The tangent to C_f at point $A(0;3)$ passes through the point $B(1;5)$.
- The line D with equation $y=1$ is an horizontal asymptote to C_f at $+\infty$



1. Using these data and the graph, give the value of $f(0)$ and the value of $f'(0)$.
2. Work out an equation of the tangent to C_f at point A.
3. Bound, between two consecutive integers, the value in units of area, of the domain between C_f , the x-axis, the y-axis and the line with equation $x=1$.
4. We now admit the function f is defined, for any real number x, by an expression in the form $f(x)=1+\frac{ax+b}{e^x}$, where a and b are real numbers.
   a. Calculate $f'(x)$ in terms of a, b and x.
   b. Using the results of question 1, prove that $f(x)=1+\frac{4x+2}{e^x}$.
5. Let F be a function defined and differentiable on ℝ such that $F(x)=x+\frac{-4x-6}{e^x}$.
   a. Prove that F is a primitive of f on ℝ.
   b. Calculate the exact value of the area the domain between C_f , the x-axis, the y-axis and the line with equation $x=1$. Is this result coherent with your answer to question 3 ?

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Exercice 3. (7.5 pts) FROM BAC ES AMERIQUE DU SUD 11/2010

1. f is the function defined on $[-3;0]$ by $f(x)=x^2$. It's mean value on $[-3;0]$ is :

   $\mu=4.5$ $\mu=3$ $\mu=\frac{1}{3}$ $\mu=-3$

2. f is the function defined on ℝ by $f(x)=ln(x^2+x+1)$. It's derivative on ℝ is :

   $f'(x)=\frac{1}{x^2+x+1}$ $f'(x)=\frac{1}{2x+1}$ $f'(x)=\frac{2x+1}{x^2+x+1}$ $f'(x)=\frac{x^2+x+1}{2x+1}$

3. The primitive F of the function f defined on $]0;+\infty[$ by $f(x)=\frac{2x^2-x+3}{x}$ such that $F(1)=1$ satisfies :

   $F(x)=\frac{\frac{2}{3}x^3-\frac{1}{2}x^2+3x}{\frac{1}{2}x^2}-\frac{17}{3}$ $F(x)=x^2-1+3ln\,x$

   $F(x)=x^2-x+3ln\,x+1$ $F(x)=2-\frac{3}{x^2}+1$

4. f is the function defined on $]0;+\infty[$ by $f(x)=\frac{5}{x}$. The area (expressed in Units of Area) bounded by its graph $\mathcal{C}$, the x-axis and the lines with equation $x=1$ and $x=2$ is equal to :

   $5ln\,2$ $ln10-ln5$ 3.466 $ln\frac{2}{5}-ln\frac{1}{5}$

5. f is the function defined on ℝ by $f(x)=2e^{-x}+1$. An approximate value of the mean value of f between 0 and 1, rounded to the thousandth is :

   1.264 2.264 –0.264 0.213