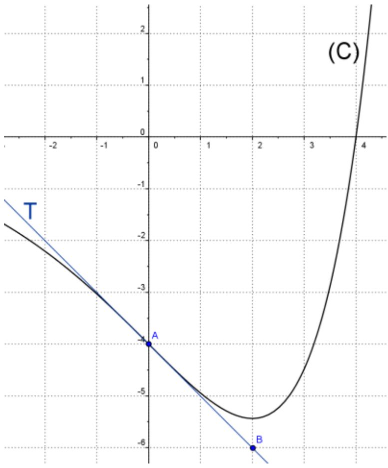
Lycée International Manosque Tle ES

TEST N°3
NOVEMBER 12TH 2012

EXERCISE 1 (12 PTS)



PART A

The curve (C) opposite represents, in an orthogonal coordinate system, a function f defined on $\mathbb{R}$. The tangent T to (C) at point $A(0;-4)$ passes through $B(2;-6)$. We denote f' the derivative of f.

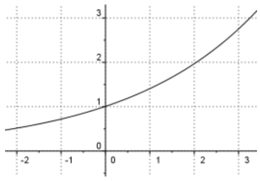
1. a. Give $f(0)$.
   b. Work out the equation of the line (AB) and justify that $f'(0)=-1$.
2. We take as given that there exist two real number a and b such that, for any real number x, $f(x)=(x+a)e^{bx}$.
   a. Check that $f'(x)=(bx+ab+1)e^{bx}$.
   b. Use <u>only</u> the previous results to find a and b.
   c. Study the variation of f.

PART B.

We now consider the function defined by $g(x)=f(x)+x+4$ and we take as given it is increasing on $\mathbb{R}$.

1. Calculate $g(0)$. Deduce the sign of g on $\mathbb{R}$.
2. Work out the relative position of (C) with regards to its tangent T.

EXERCICE 2. (8 PTS) TRUE/FALSE Circle the right answers (can be more than one)



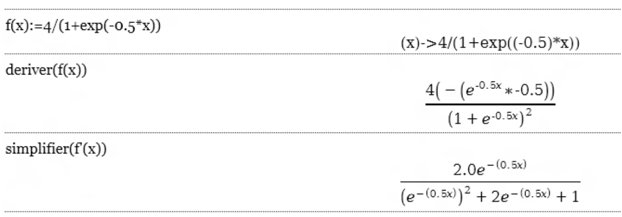
1. This is the graph of an exponential function with base q.
$0<q<1$ $\qquad q>1$ $\qquad q>2$ $\qquad q<2$

2. The function $f(x)=0.92^x$ is :
Increasing on $[0;+\infty[$ $\qquad$ Decreasing on $]-\infty;0]$
Smaller than 1 on $[0;+\infty[$ $\qquad$ Strictly positive on $\mathbb{R}$

3. The expression $\dfrac{e^{x-1}\times e^{2x}}{\left(e^{x+1}\right)^2}$ is equal to : $\dfrac{e^{x-1}}{e^2}$ $\qquad e^{-3}\times e^{2x}$ $\qquad e^{x-3}$ $\qquad \dfrac{e^{3x-1}}{e^{x^2+1}}$

4. The set of solutions of the inequation $2e^x\left(e^x-1\right)\leq 0$ is :
$S=[0;+\infty[$ $\qquad S=[1;+\infty[$ $\qquad S=]-\infty;0]$ $\qquad S=\varnothing$

5. Opposite is a screen copy of a CAS software. The gradient of the tangent to the graph of the function f at 0 is :
0 $\qquad$ 0.5 $\qquad$ 1 $\qquad$ 2



6. The derivative of $f(x)=xe^{-2x}-x$ is :
$f'(x)=-3x$ $\qquad f'(x)=e^{-2x}-1$
$f'(x)=-1-(2x-1)e^{-2x}$ $\qquad f'(x)=(1-2x)e^{-2x}-1$

7. Opposite is the graph of a function u defined on $[-3;5]$ .The function $f(x)=e^{u(x)}$ is :
Increasing on $[-1;3]$ $\qquad$ Increasing on $[-3;1]$
Positive on $[-1;3]$ $\qquad$ Positive on $[-3;5]$