Name:

Matricule number:

Alternative end-term test
Business Mathematics 1
Groups 6 and 7
Spring 2014

example	*max.pts.*	*pts.*
1	3	...
2	3	...
3	3	...
4	3	...
total :	12	...

Instructions:

- No documents, no calculators
- Write your answers to an example in the corresponding indicated blank spaces
- All the answers must be justified
- The clarity and readability of the copy will be taken into account in the final mark

1) a) Calculate the second derivative of the following function.

$$f(x) = 2^{\ln(x)}.$$

b) Calculate the first derivative of the following function.

$$f(x) = \tan(x^2).$$

2) a) Let f be the following function, that we define on $(1/3, +\infty)$.

$$f(x) = \frac{\ln(4x^3)}{\ln(3x)} - 2.$$

Find the zero of f on $(1/3, +\infty]$.

b) Let f be the following function, defined on $(0, +\infty)$.

$$f(x) = \ln(x) - x^{\frac{1}{3}}.$$

Study the convexity of f.

3) a) Let $a = 0$. Find the Taylor expansion of order 3 at $x = a$ of the following function.

$$f(x) = \frac{1}{1-x}.$$

b) Let $a = 0$. Find the expression of the rest of the Taylor expansion of order 3 at $x = a$ of the following function.

$$f(x) = e^{2x}.$$

Find the maximum possible value of this rest at $x = 0.1$.

4) a) Find an antiderivative of the following function

$$f(x) = \frac{x^3}{x^2 - 1}.$$

b) Calculate the following integral.

$$\int_0^1 x e^{-\frac{x^2}{2}} dx.$$

Answer to 1) a):

Answer to 1) b):

Answer to 2) a):

Answer to 2) b):

Answer to 3) a):

Answer to 3) b):

Answer to 4) a):

Answer to 4) b):