

### **Subject 33**

Please don't write on the exam paper.

**Multiple Choice Questionnaire (MCQ) :** find the only good answer to the following questions :  
(you must justify your answers) :

#### **Percentages and exponential growth and decay .**

1) The population of a certain town has been falling at a constant rate of 2% each year. This town's population shall be divided by two in :

- a) 15 years                      b) 20 years                      c) 35 years                      d) 50 years.

2) The world population has doubled between the years 1960 and 2000. The annual average rate of change has been of :

- a) 3%                              b) 2.75%                              c) 2.5%                              d) 1.75%.

*Average rate of change : taux d'accroissement annuel moyen.*

3) The price of an article increases by a certain percentage, then it decreases by the same percentage. Finally, the price of this article has :

- a) increased                      b) decreased                      c) not varied.

#### **Variations of functions by operations**

4) Let  $f$  be the function defined on the interval  $]0;+\infty[$  by  $f(x) = x^2 - 4 - \frac{1}{x}$ .

Without calculating the derivative, we can prove that :

- a)  $f$  is an increasing function ;    b)  $f$  is a decreasing function ;    c) we can't conclude.

5) Let  $g$  be the function defined on the interval  $]0;+\infty[$  by  $g(x) = -2x + 5 - 4\sqrt{x}$ .

Without calculating the derivative, we can prove that :

- a)  $g$  is an increasing function ;    b)  $g$  is a decreasing function ;    c) we can't conclude.

6) Let  $h$  be the function defined on the interval  $]0;+\infty[$  by  $h(x) = x^3 - \frac{1}{2x}$ .

Without calculating the derivative, we can prove that :

- a)  $h$  is an increasing function ;    b)  $h$  is a decreasing function ;    c) we can't conclude.