

Sujet n°31

**Please do not write on the exam paper.
Please do not forget to give it back at the end of the examination.**

Functions

Let f be a function defined by $f(x)=x^2$ for all real number x .

Let C_f be the curve of function f , and T_s be the tangent to C_f at the point of abscissa s . We want to prove that for any real number s , T_s lies below C_f (or equivalently C_f lies over T_s).

- 1) Sketch a figure with C_f and several tangents.
- 2) Show that T_s has for equation $y=2sx-s^2$.

We denote by L the linear function whose curve is T_s .

We say that the curve C_f of f is “over” the curve T_s of L if for all x , $f(x) \geq L(x)$.

Let $P(x)=f(x)-L(x)$

- 3) What kind of function is $P(x)$?
- 4) What is the sign of $P(x)$?
- 5) What can we deduce?