

## Derivatives and applications

### I - Formal calculations :

1. Find a simple formula for the derivative function of  $f : x \mapsto \frac{ax+b}{cx+d}$

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2. Let  $f : x \mapsto \frac{1}{\sqrt{x}}$

a) Find the growth rate of  $f$  at  $x=1$ , and compute its limit in 1.

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b) Compute  $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$  ( $x > 0$ ) and then give the formula of the derivative of the above function.

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II . Use the general formulas of the derivatives to compute the derivative of the following functions, study their domain of existence, their sign and determine the way of variation on each interval (chart).

$$f_1(x) = \frac{x^2 + 4x + 5}{x^2 - 2x - 3}$$

$x$	$-\infty$	$+\infty$
<i>Sign</i> [ $f_1'(x)$ ]		
Variations of $f_1$		

$$f_2(x) = \sqrt{x^2 - 2x - 3}$$

$x$	$-\infty$	$+\infty$
<i>Sign</i> [ $f_2'(x)$ ]		
Variations of $f_2$		