

Exercice 1Calc. : XSoit f la fonction définie par $f(x) = \ln(3x - 2)$.**Déterminer** l'équation réduite de la tangente à la courbe représentative de f en $x = 1$.

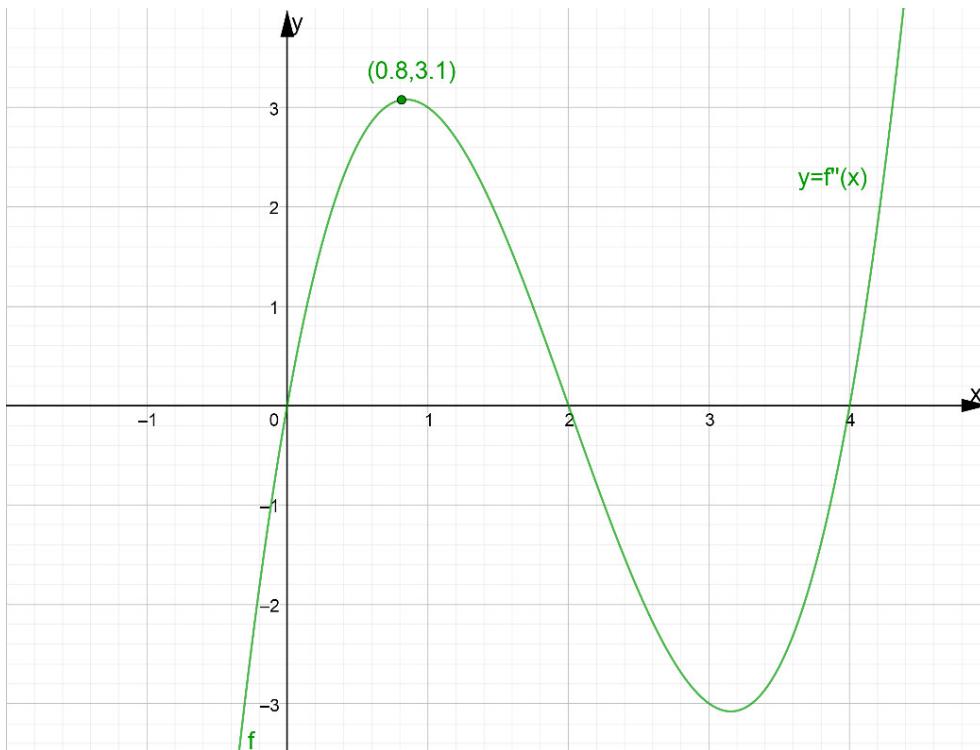
4 marks

Exercice 2Calc. : XSoit f la fonction définie par $f(x) = \frac{2x - 1}{x - 1}$ et f^{-1} la fonction réciproque de f .**Résoudre** l'équation $f^{-1}(x) = 2$.

3 marks

Exercice 3Calc. : XLe graphique ci-dessous est celui de la dérivée seconde f'' d'une fonction.**Indiquer** lesquels des énoncés suivants sont vrais et lesquels sont faux.**Justifier** votre réponse.

1. Le graphique de f est concave pour $-0,5 < x < 2$. 2 marks
2. Le graphique de f a un point d'inflexion en $x = 0$. 2 marks
3. Si $f'(0) = 0$, alors le graphique de f a un point d'inflexion avec une tangente horizontale en $x = 0$. 2 marks

**Exercice 4**Calc. : XLet f and g be two functions defined by:

$$f(x) = a + e^{-x+1} \quad g(x) = \frac{b \cdot x + 2}{x - 1}$$

where a and b are real numbers.Find the values of a and b such that f and g have the following properties:

5 marks

- f and g have the same limit in $+\infty$.
- The graphs of functions f and g intercept in a point with abscissa 2.

Exercise 5Calc. : X

Let a and b be two non-zero real numbers and f be the function defined over \mathbb{R} by:

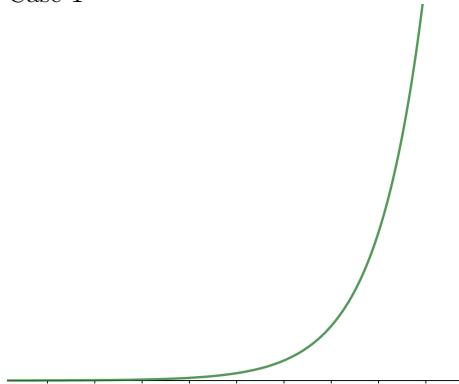
$$f(x) = a \cdot e^{bx}$$

Here are two possible shapes for the curve of this function.

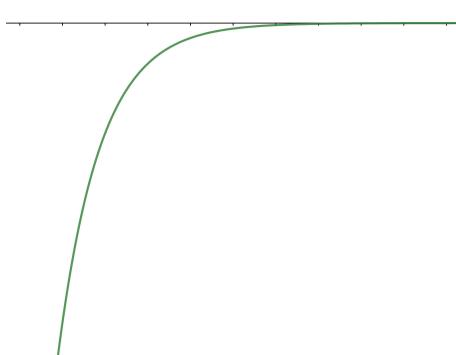
In each case, give the possible values for a and b .

5 marks

Case 1



Case 2

**Exercise 6**Calc. : X

Let f and g be two functions defined by

$$f(x) = -\frac{1}{2} (e^{2x} + e^{-2x}) \quad g(x) = x^n \cdot \ln(x)$$

where n is a positive integer.

Prove that the graphs of these two functions never intersect, whatever the value of n .

7 marks

Exercise 7Calc. : X

Let f be the function defined on $(0, +\infty)$ by $f(x) = a + b \frac{\ln(x)}{x}$.

The representative curve of the function f admits an asymptote horizontal with equation $y = 1$ and a tangent at the point of abscissa 1 with equation $y = -x + 2$.

Determine the values of a and b .

5 marks

Exercise 8Calc. : X

A metal chain hangs between two walls.

Its height above the ground level can be described by the equation:

$$h(x) = e^{-x} + e^{x-1} + 2,$$

where x is the distance in meters along the ground from the left wall.

Calculate how many meters from the left wall this chain is closest to the ground.

5 marks