

Applications of the Derivatives to the variations of functions
[use one full page per function to answer. See model on next page].

For each of the following functions :

1. Give the set of **definition**, D_f , in the form of intervals (open or closed).
2. Calculate and **factor** the **Derivative** by using the general formulas
3. Solve the **equation** $f'(x) = 0$.
4. Study the **sign** of the derivative on the intervals of D_f .
5. Chart the sign of $f'(x)$ on D_f and give the **variations** of f accordingly.
6. Show in the chart the **limits**, and **maximum** or **minimum**, if any.
7. Find the coordinates of the **interception with (Ox)**
8. Find the coordinates of the **interception with (Oy)**.
9. Write the **equation** of the **tangent line** to the interception with (Oy)
10. Draw the **asymptotes** and the curve of the function very carefully.

You may check your answers on a computer or a graphic calculator, but you must complete the variation chart and draw the curve by yourself!

$$f_1(x) = \frac{1}{6}x^3 + \frac{1}{4}x^2 - 3x + 2$$

$$f_2(x) = x^4 - 4x^2 + 1$$

$$f_3(x) = \frac{2x^2 + 8x + 1}{x(x + 4)}$$

$$f_4(x) = \frac{x^2 + 2x + 3}{x^2 - 2x - 3}$$

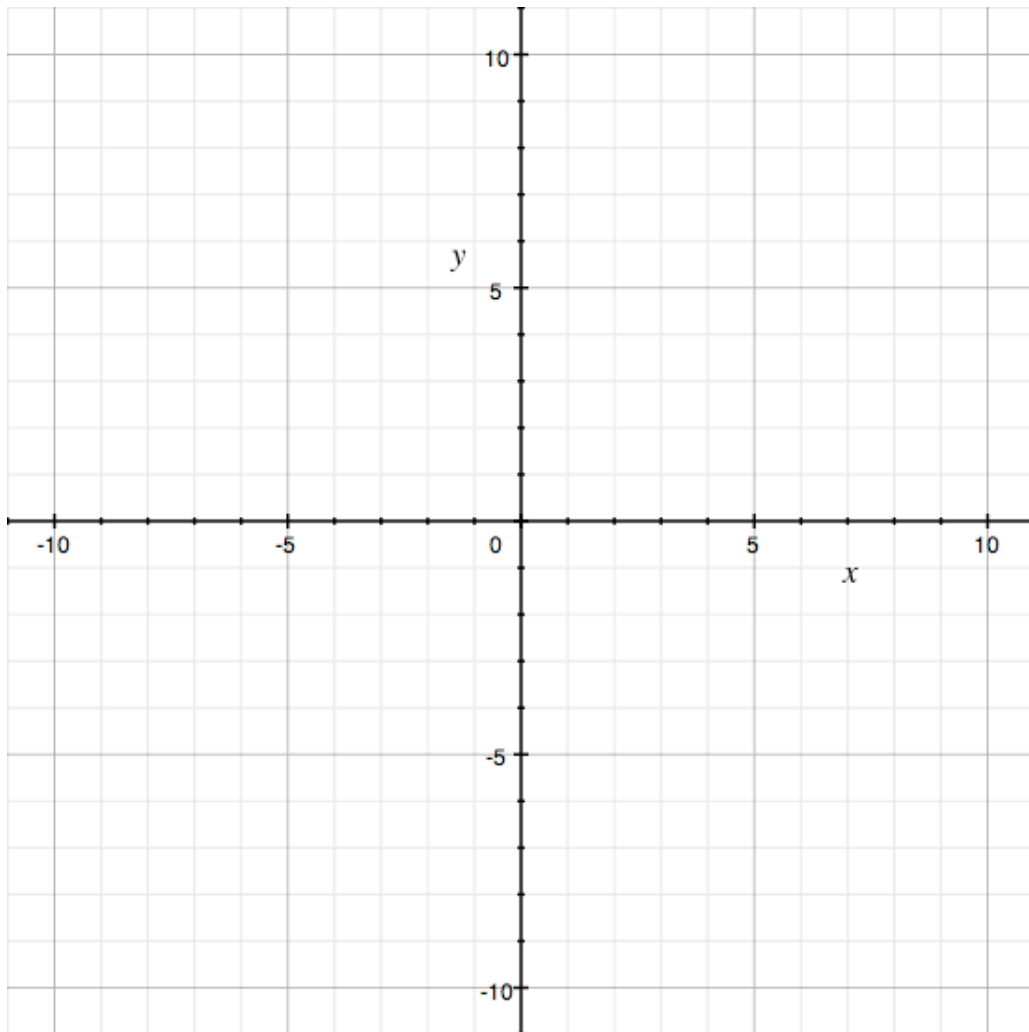
$$f_5(x) = \frac{x}{1 - x^2}$$

$$f_6(x) = \frac{(x + 1)^2}{x^2 - x - 6}$$

$$f_1(x) = \frac{1}{6}x^3 + \frac{1}{4}x^2 - 3x + 2$$

1. Set of definition : $D_f =$
2. Derivative $f'(x) =$
3. Zeroes of the derivative :
4. Sign of the derivative :
5. Chart : show the limits and the values of Maximum or minimum if any.

x	$-\infty$	$+\infty$
Sign [$f'(x)$]		
Variations and limits of f		



$$f_2(x) = x^4 - 4x^2 + 1$$

6. Set of definition : $D_f =$

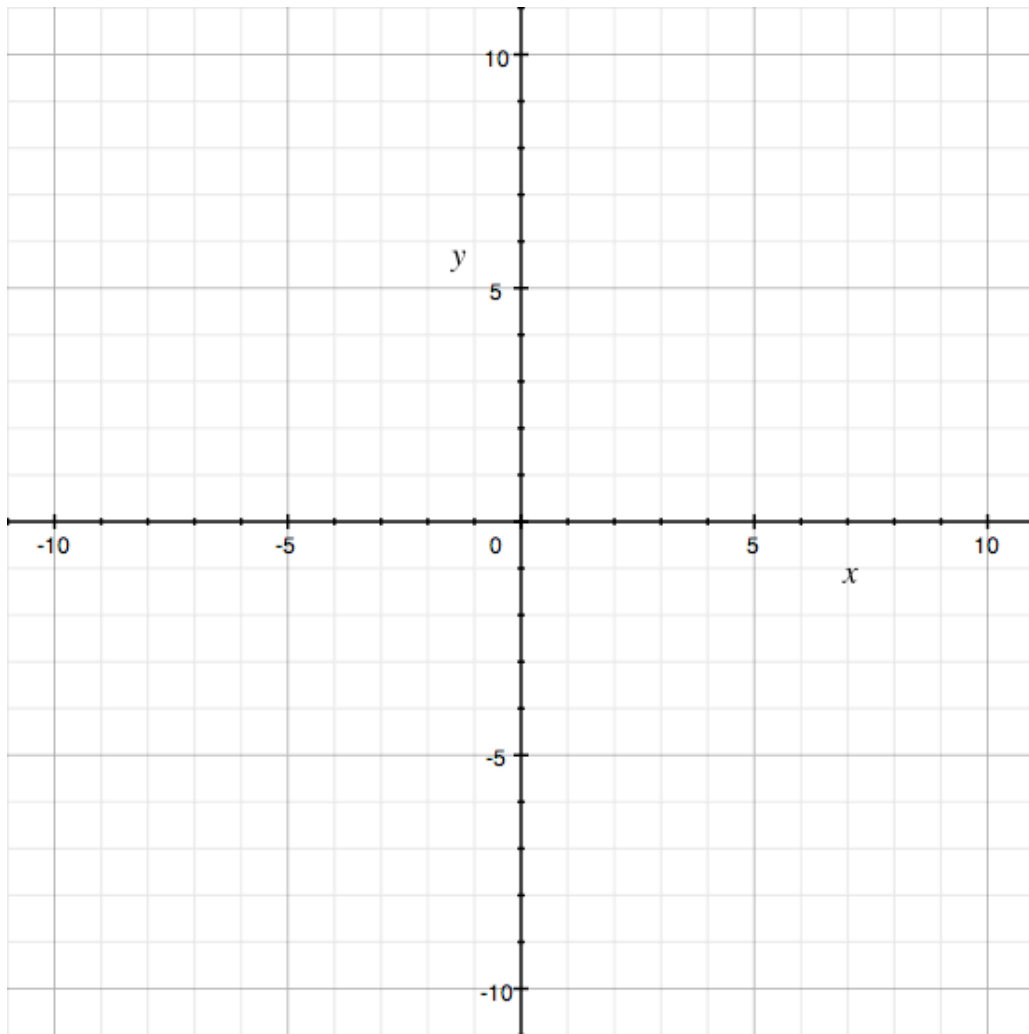
7. Derivative $f'(x) =$

8. Zeroes of the derivative :

9. Sign of the derivative :

10. Chart : show the limits and the values of Maximum or minimum if any.

x	$-\infty$	$+\infty$
Sign $[f'(x)]$		
Variations and limits of f		



$$f_3(x) = \frac{2x^2 + 8x + 1}{x(x + 4)}$$

11. Set of definition : $D_f =$

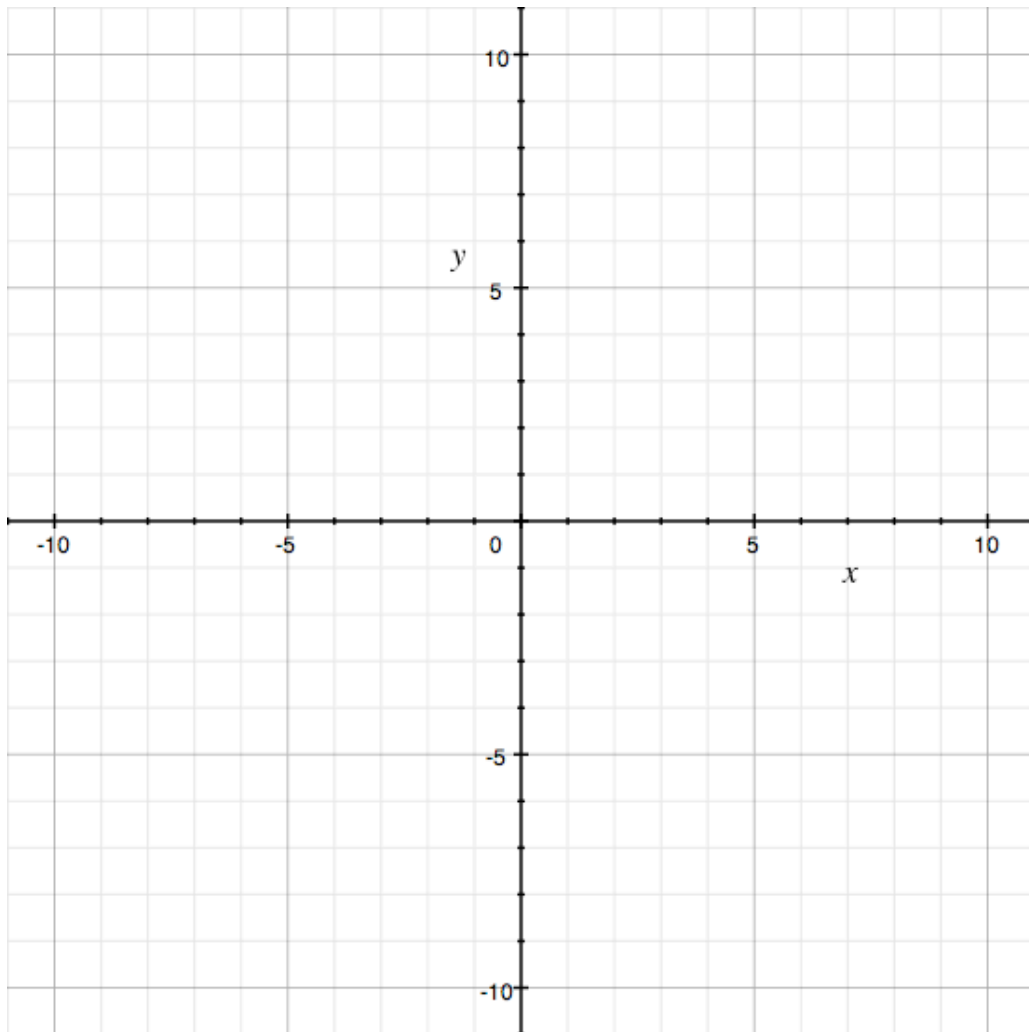
12. Derivative $f'(x) =$

13. Zeroes of the derivative :

14. Sign of the derivative :

15. Chart : show the limits and the values of Maximum or minimum if any.

x	$-\infty$	$+\infty$
Sign $[f'(x)]$		
Variations and limits of f		



$$f_4(x) = \frac{x^2 + 2x + 3}{x^2 - 2x - 3}$$

16. Set of definition : $D_f =$

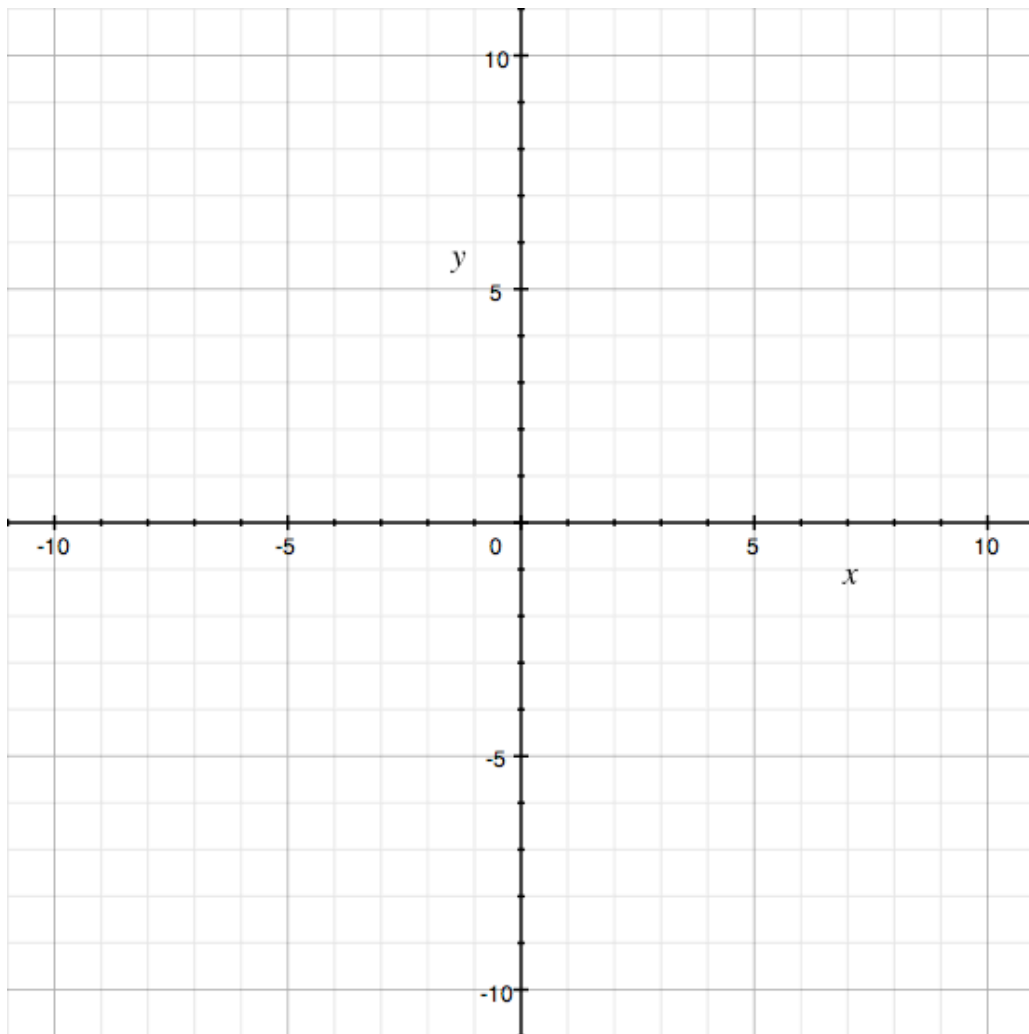
17. Derivative $f'(x) =$

18. Zeroes of the derivative :

19. Sign of the derivative :

20. Chart : show the limits and the values of Maximum or minimum if any.

x	$-\infty$	$+\infty$
Sign $[f'(x)]$		
Variations and limits of f		



$$f_5(x) = \frac{x}{1-x^2}$$

21. Set of definition : $D_f =$

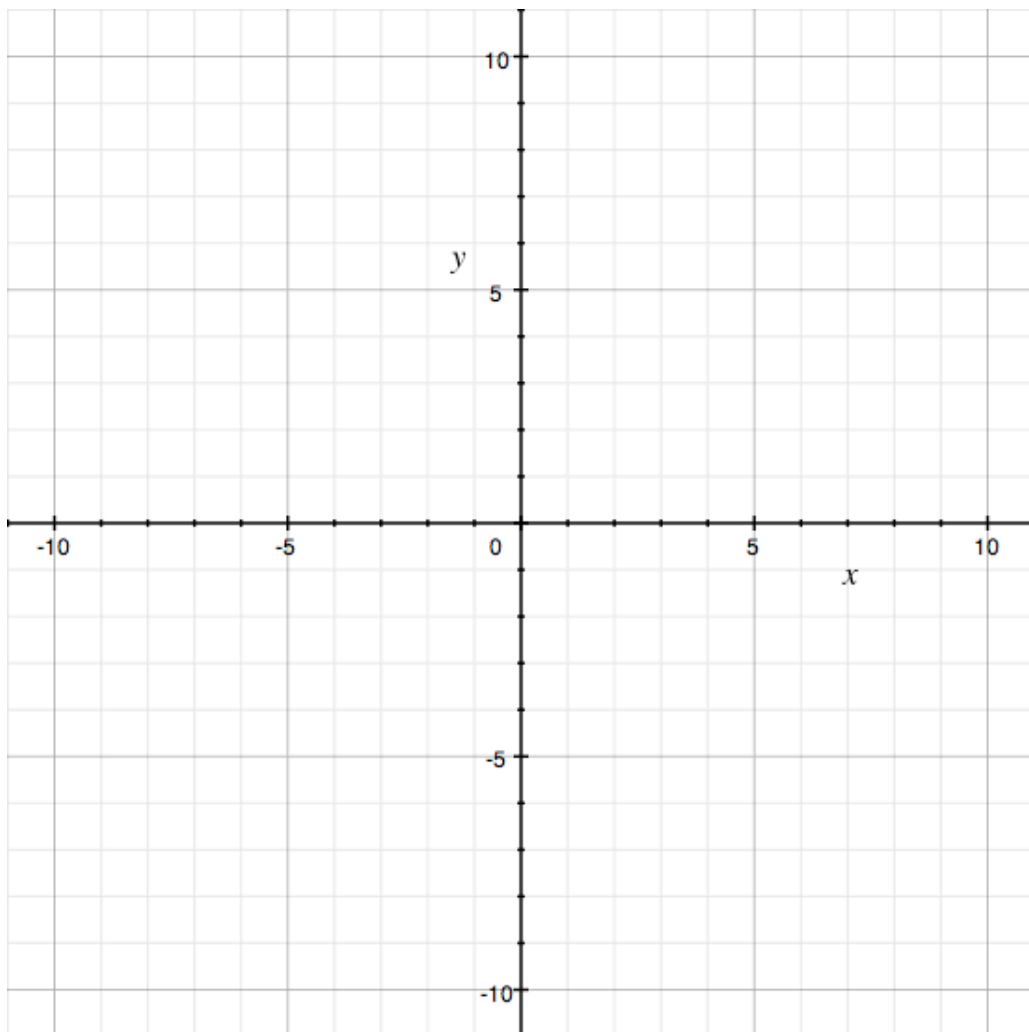
22. Derivative $f'(x) =$

23. Zeroes of the derivative :

24. Sign of the derivative :

25. Chart : show the limits and the values of Maximum or minimum if any.

x	$-\infty$	$+\infty$
Sign $[f'(x)]$		
Variations and limits of f		



$$f_6(x) = \frac{(x+1)^2}{x^2 - x - 6}$$

26. Set of definition : $D_f =$

27. Derivative $f'(x) =$

28. Zeroes of the derivative :

29. Sign of the derivative :

30. Chart : show the limits and the values of Maximum or minimum if any.

x	$-\infty$	$+\infty$
Sign $[f'(x)]$		
Variations and limits of f		

