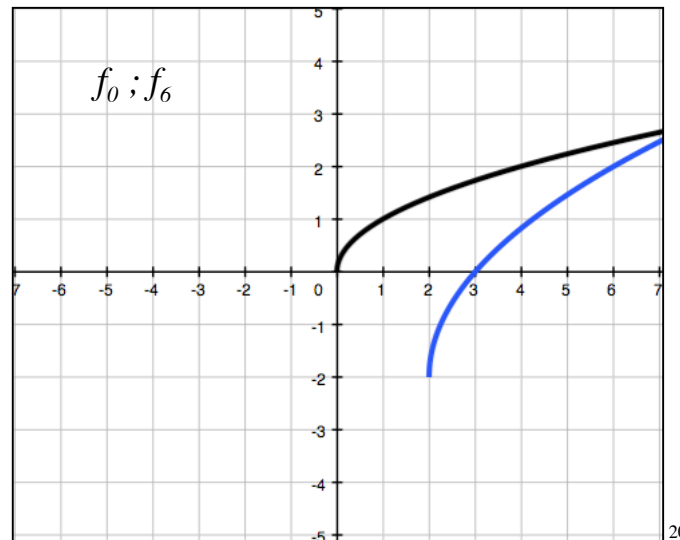
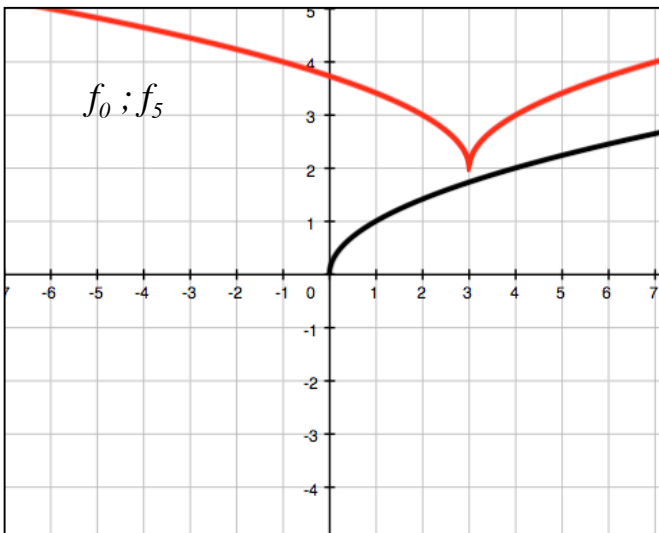
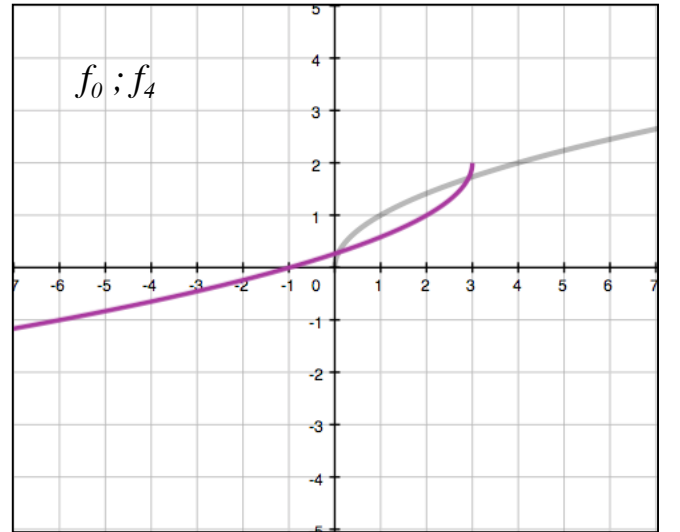
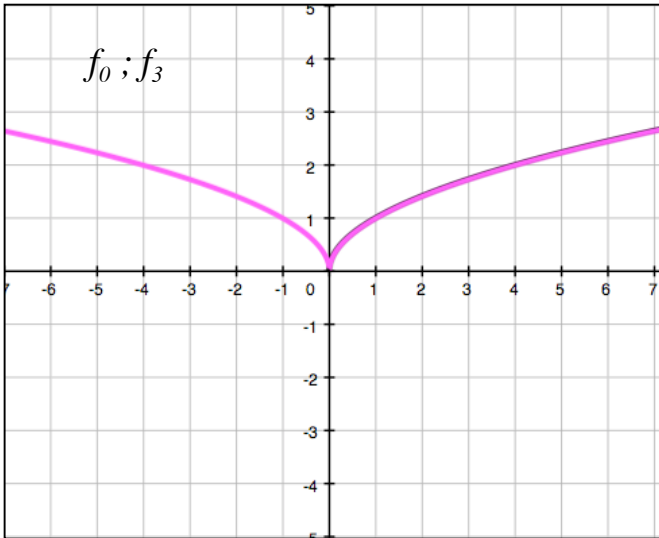
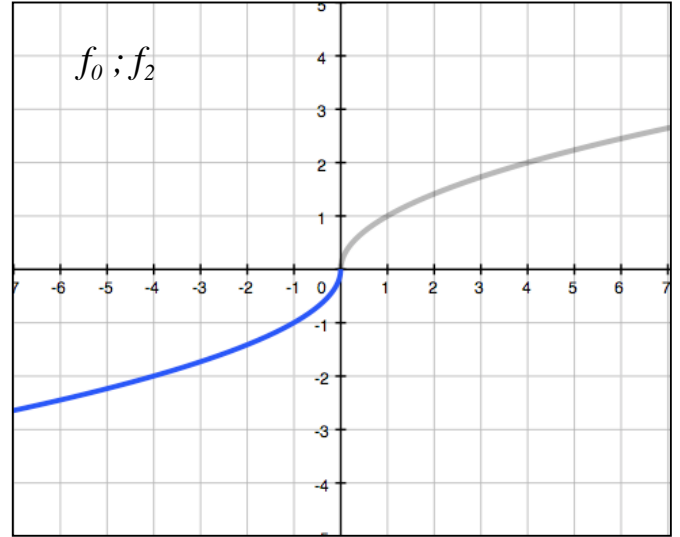
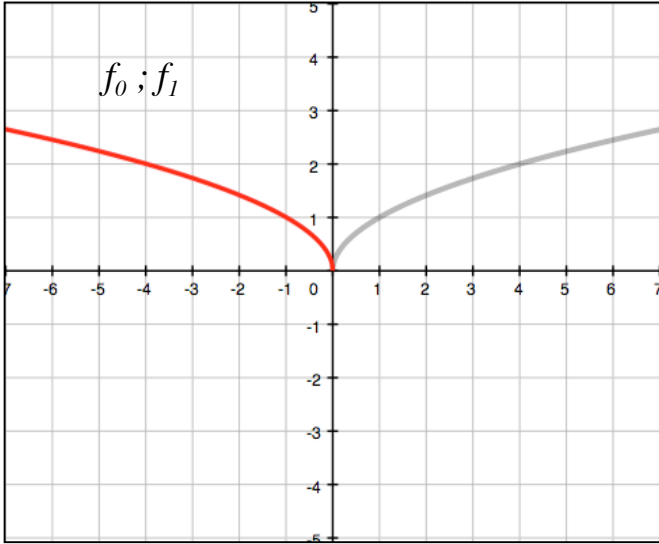


I –Functions with Absolute value and Radicals. Sketch the graph of each of the following functions : f_1 to f_6 in the same picture as f_0 .

$$f_0(x) = \sqrt{x} \quad ; \quad f_1(x) = \sqrt{-x} \quad ; \quad f_2(x) = -\sqrt{-x} \quad ; \quad f_3(x) = \sqrt{|x|}$$

$$f_4(x) = -\sqrt{3-x} + 2 \quad ; \quad f_5(x) = \sqrt{|x-3|} + 2 \quad ; \quad f_6(x) = \sqrt{4x-8} - 2$$

\$



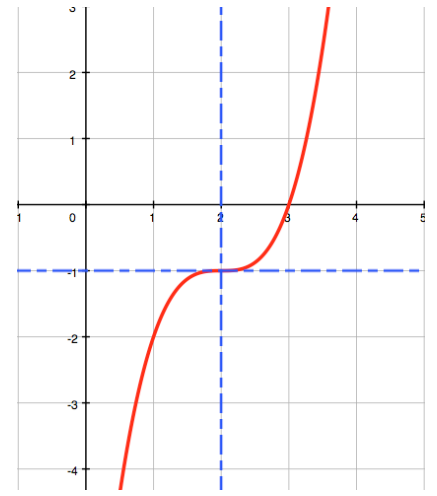
II – Study the symmetries of each of the following functions : find their axes or center of symmetry and **verify by showing the appropriate calculations** :

1. $y = f(x) = x^3 - 6x^2 + 12x - 9$

To prove that $I(2;-1)$ is the center of Symmetry of (C_f) , let $F(X) = f(2+X) - (-1)$ and show that F is an ODD function :

- $(2+X)^3 = 8 + 12X + 6X^2 + X^3$
- $-6(2+X)^2 = -24 - 24X - 6X^2$
- $12(2+X) - 9 = 24 + 12X - 9$

 $F(X) = f(2+X) + 1 = X^3 \Rightarrow F$ is ODD

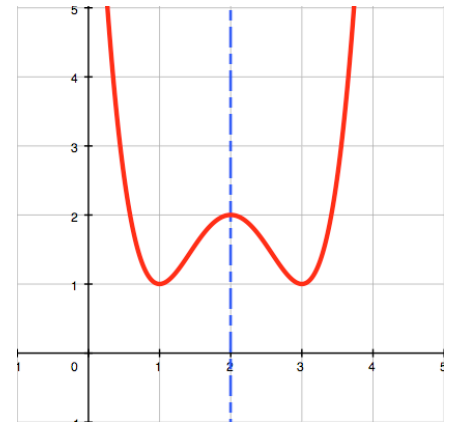


2. $y = f(x) = x^4 - 8x^3 + 22x^2 - 24x + 11$

To prove that $(\Delta) (x=2)$ is an Axis of Symmetry of (C_f) , let $F(X) = f(2+X)$ and show that F is EVEN :

- $(2+X)^4 = 16 + 32X + 24X^2 + 8X^3 + X^4$
- $-8(2+X)^3 = -64 - 96X - 48X^2 - 8X^3$
- $+22(2+X)^2 = +88 + 88X + 22X^2$
- $-24(2+X) + 11 = -48 - 24X + 11$

 $F(X) = f(2+X) = X^4 - 2X^2 + 3 \Rightarrow F$ is EVEN

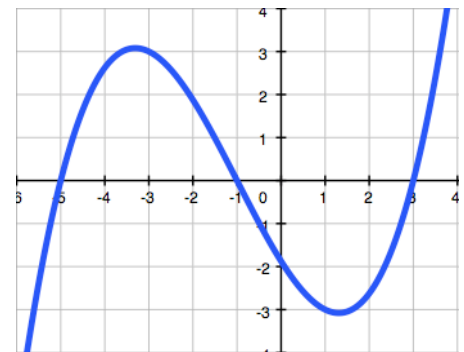


3. $y = f(x) = \frac{1}{8}(x^3 + 3x^2 - 13x - 15)$

To prove that $I(-1;0)$ is the center of Symmetry of (C_f) , let $F(X) = f(-1+X) - 0$ and show that F is ODD :

- $(X-1)^3 = X^3 - 3X^2 + 3X - 1$
- $+3(X-1)^2 = 3X^2 - 6X + 3$
- $-13(X-1) - 15 = -13X + 13 - 15$

 $F(X) = f(-1+X) = (1/8)X^3 - 2X \Rightarrow F$ is ODD



4. $y = f(x) = \frac{x^2 - 2x - 3}{x^2 - 2x - 8}$

There is no central and no axial symmetry possibility in this picture, because :

- If there was one axial symmetry it must be at $x = 1$ but then infinite branches don't match.
- There is no way of placing a possible center of symmetry.

