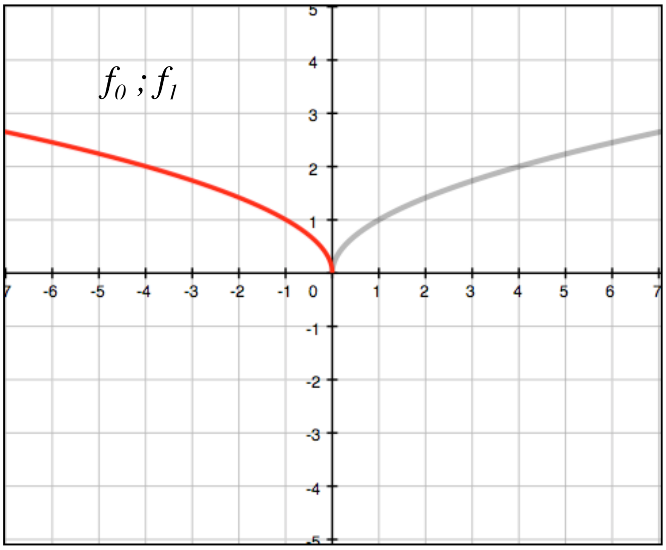
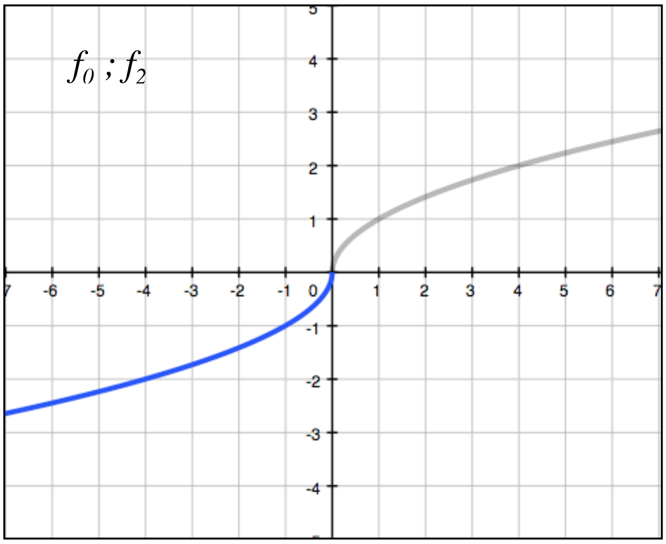
http://beijingshanmaths.org Name : ANSWERS . Grade : ....
jiguanglaoshi@gmail.com

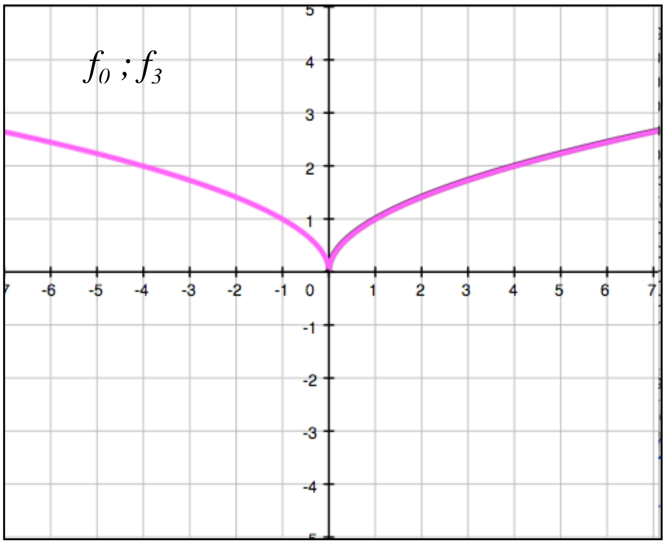
I –Functions with Absolute value and Radicals. Sketch the graph of each of the following functions : f_1 to f_6 in the same picture as f_0.

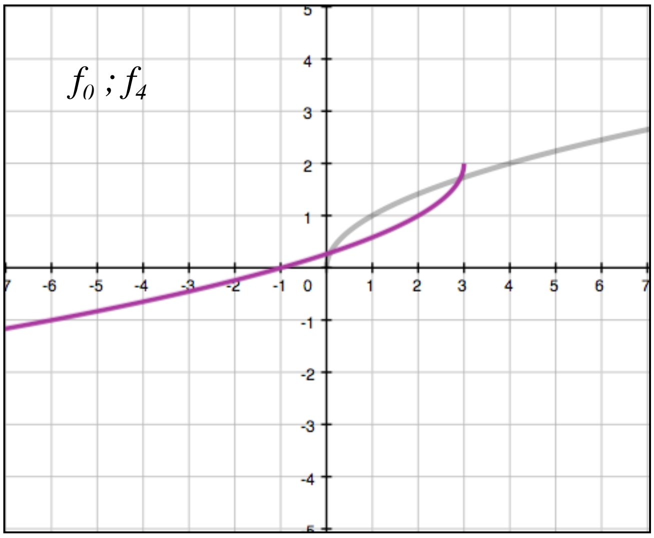
$$f_0(x)=\sqrt{x} \quad ; \quad f_1(x)=\sqrt{-x} \quad ; \quad f_2(x)=-\sqrt{-x} \quad ; \quad f_3(x)=\sqrt{|x|}$$

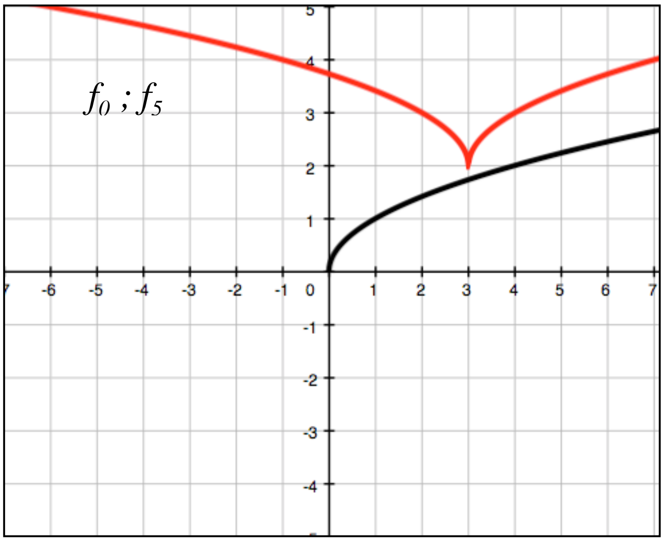
$$f_4(x)=-\sqrt{3-x}+2 \quad ; \quad f_5(x)=\sqrt{|x-3|}+2 \quad ; \quad f_6(x)=\sqrt{4x-8}-2$$

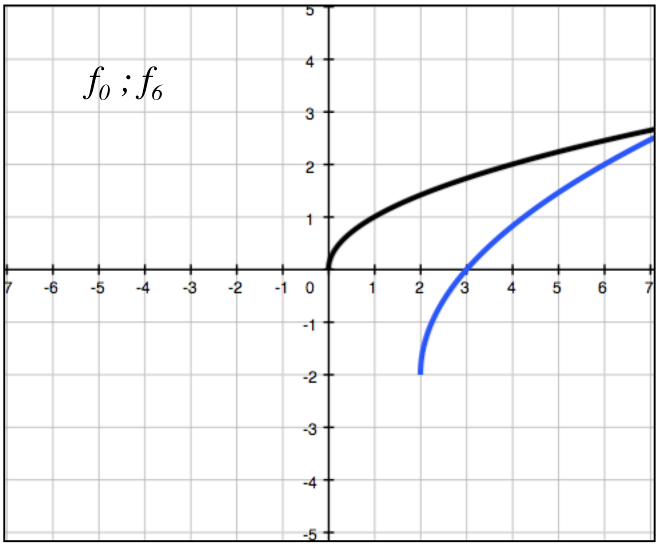












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Junior 9.5 - Assign. #3 : 2011 Nov.1, - p.2/2

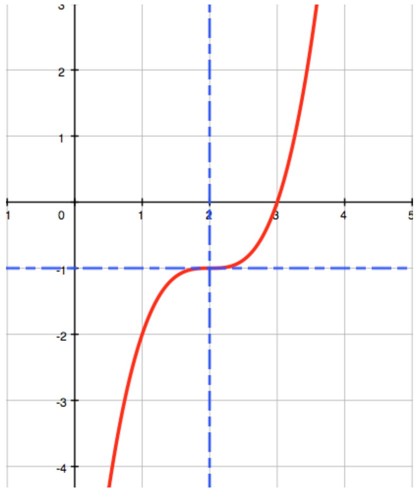
II – Study the symmetries of each of the following functions : find their axes or center of symmetry and **verify by showing the appropriate calculations** :

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*

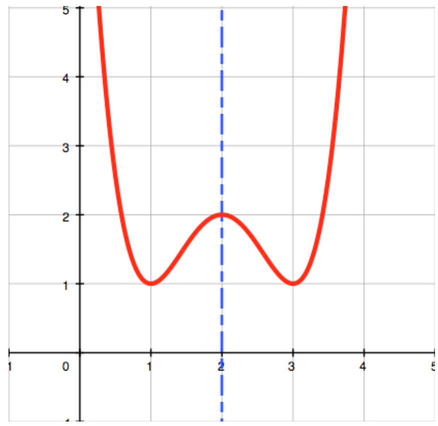


2. $y = f(x) = x^4 - 8x^3 + 22x^2 - 24x + 11$

To prove that (Δ) (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*

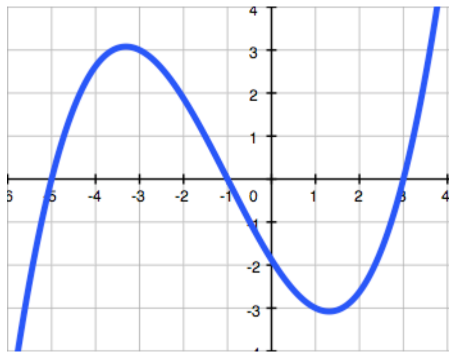


3. $y = f(x) = \frac{1}{8}\left(x^3 + 3x^2 - 13x - 15\right)$

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 symettry it must be at x = 1 but then infintite branches don not match.*
- *There is no way of placing a possible center of symmetry.*