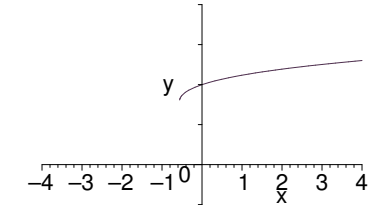
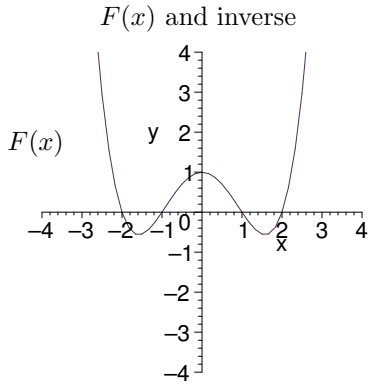


# Transformations of $F(x) = (x - 1)(x - 2)(x + 1)(x + 2)$



$F^{-1}(x)$

The inverse graphed here is

$$F^{-1}(x) = \sqrt{\left(\frac{5 + \sqrt{9 + 16x}}{2}\right)}$$

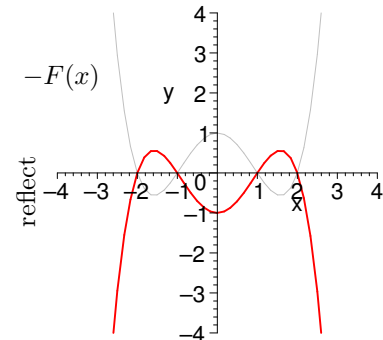
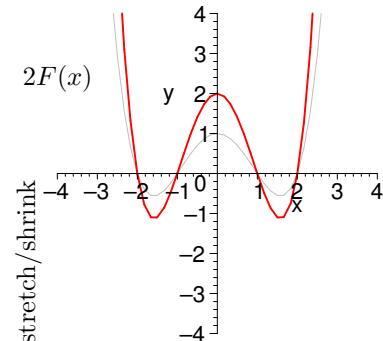
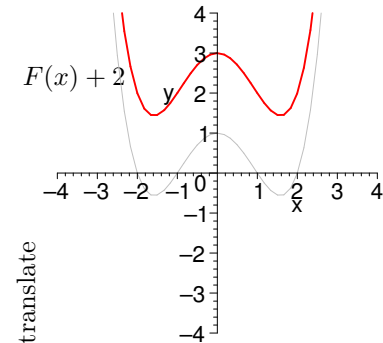
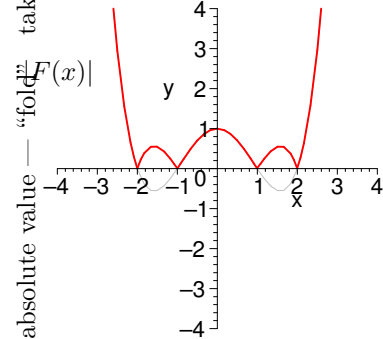
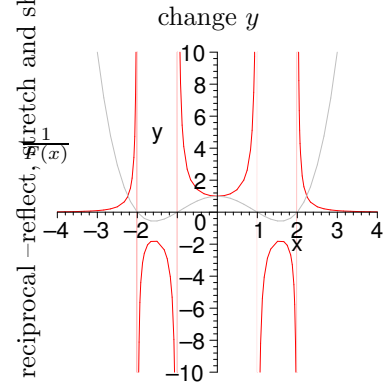
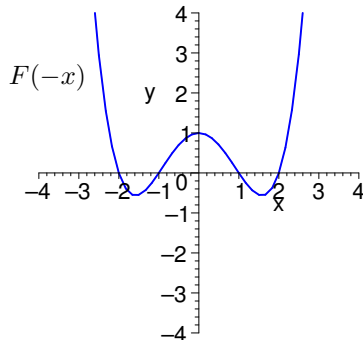
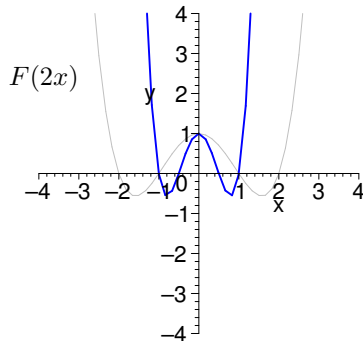
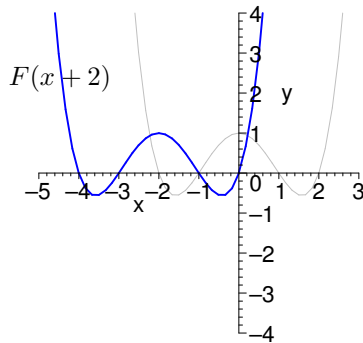
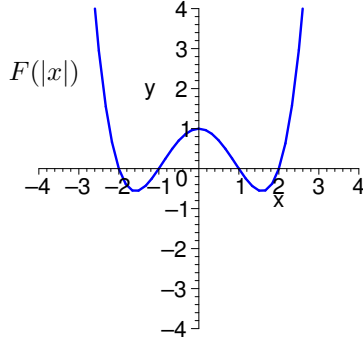
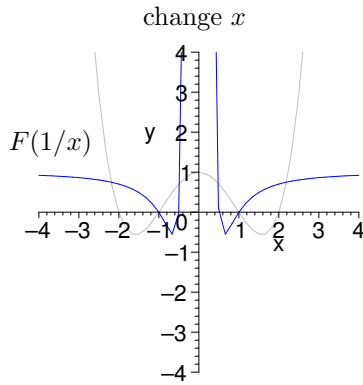
This is obtained by solving  $F(x) = y$  i.e.,  $F(x) - y = 0$ , i.e., solve  $x^4 - 5x^2 + 4(1 - y) = 0$ , using the quadratic formula, to obtain  $x = F^{-1}(y)$ . Finally, change  $x$  to  $y$ , to get the usual variables used. (I.e., Mostly, functions are functions of  $x$  rather than  $y$ , though this is entirely arbitrary, but the computer program used to create these pictures wants functions to be functions of  $x$ , so we must follow this convention, or it will refer to plot graphs.)

exercise:

write the transformations  
as rational functions in  $x$

e.g.,

$$f(1/x) = \left(\frac{1}{x} - 1\right) \left(\frac{1}{x} - 2\right) \left(\frac{1}{x} + 1\right) \left(\frac{1}{x} + 2\right) \\ = \frac{(1-x)(1-2x)(1+x)(1+2x)}{x^4}$$



the graph  $F(x)$  appears in grey in each graph, to compare with the transform.