

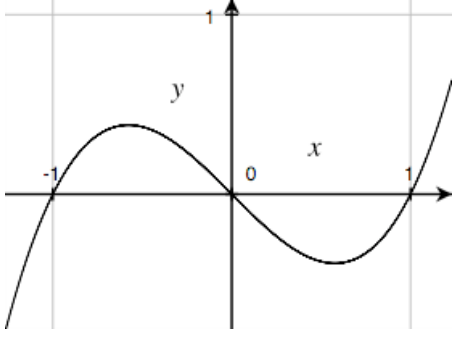
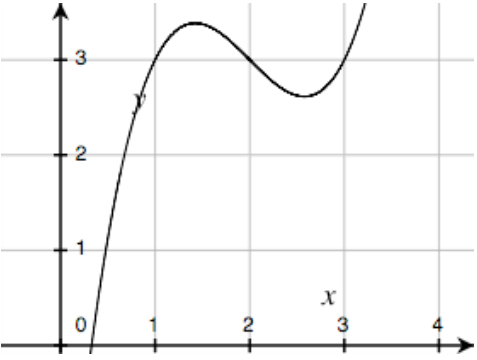
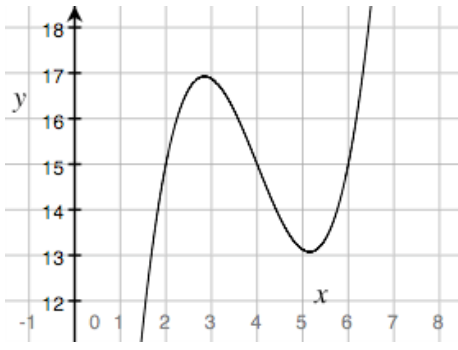
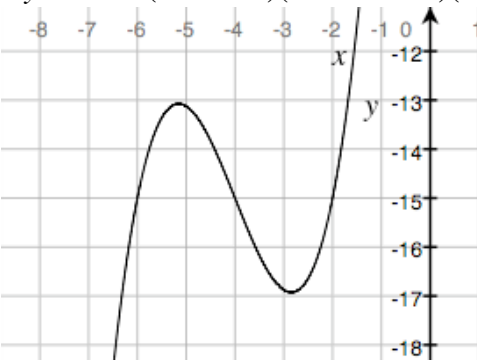
Essence of Basic Transformations

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Note: v represents one variable. In two dimensions, v could be x or y .

To	replace all parent relation's v variables by
translate c units in v direction,	$v - c$.
stretch or shrink from $v = 0$ in v direction,	cv , where $0 < c < 1$ stretches and $1 < c$ shrinks. (See note below.)
reflect in $v = 0$,	$-v$.
reflect in origin: reflect in $v = 0$ for all v .	

For example:

<p>1. Parent, $y = x(x+1)(x-1)$:</p> 	<p>2. Translate up 3, right 2 (translation vector: $\langle 2, 3 \rangle$), $y - 3 = (x - 2)(x - 2 + 1)(x - 2 - 1)$:</p> 
<p>3. Stretch vertically 5 units and horizontally 2, $y/5 - 3 = (x/2 - 2)(x/2 - 2 + 1)(x/2 - 2 - 1)$</p> 	<p>4. Reflect in origin (note axes scales): $-y/5 - 3 = (-x/2 - 2)(-x/2 - 2 + 1)(-x/2 - 2 - 1)$</p> 

Note on stretching: Some texts treat stretching in x and y directions differently, e.g., Blitzer, Precalculus, 2nd Ed. In this case, $y = f(x) \longrightarrow y = c_y f(c_x x)$, where $0 < c_x < 1$ stretches and $1 < c_x$ shrinks in the x direction, but in the y direction $0 < c_y < 1$ shrinks and $1 < c_y$ stretches.