TRANSFORMATIONS OF FUNCTIONS II

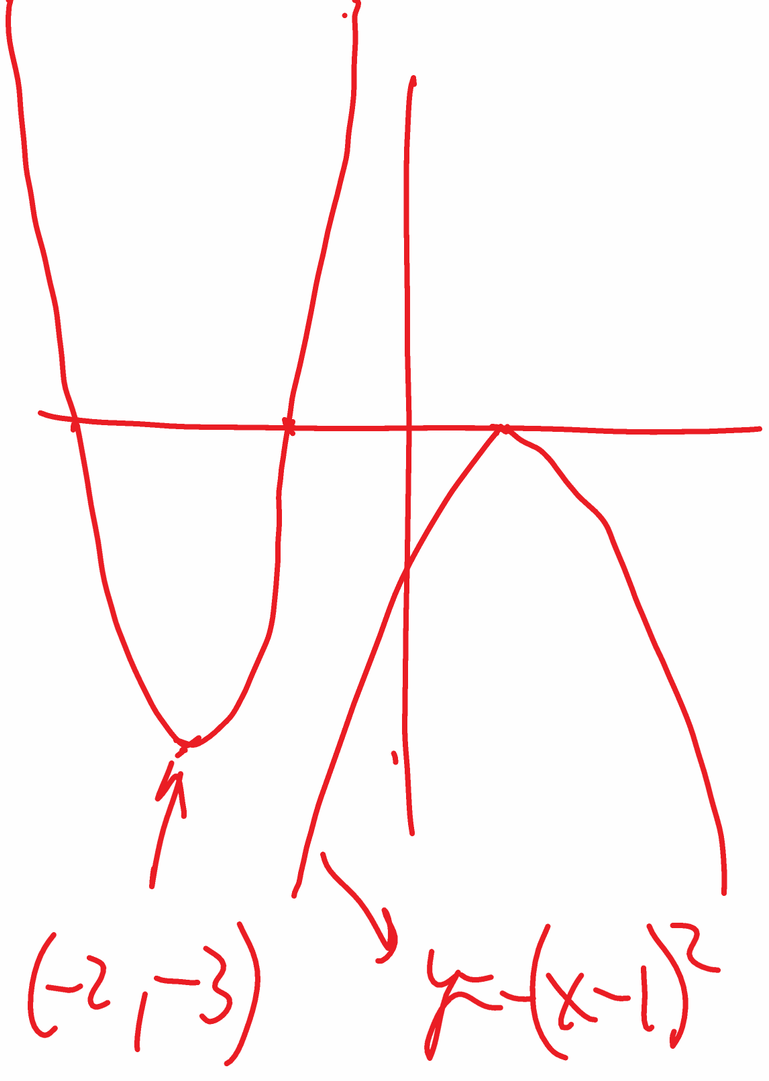
Thu 10 Jan 2019

the "algebraic" approach

Review: Before This type of problems

1) Base funct: $y = x^2$, state the transformation $y = 3(x+2)^2 - 3$
   (relative to the base func.)
   - ← 2 units
   - ↓ 3 units
   - Vert stretch by factor 3

2) Base funct: $y = -(x-1)^2$; Idem



$y=3(x+2)^2-3$

- ← 3 units
- ↓ 3 " "
- Reflection along x-axis
- vertical stretch by factor 3

2: New type of problems: Examples

(A) $f(x) = x^2$. Write the expressions of the following functions:

① $g(x) = f(x-3) = (x-3)^2$

② $h(x) = f(2x+1) = (2x+1)^2$

③ $r(x) = 3f(x) = 3x^2$

④ $s(t) = 2f(t) - 1 = 2t^2 - 1$

$g(1) = f(1-3) = f(-2) = 4$

$g(0) = f(0-3) = f(-3) = 9$

(B) Be $f(x) = (x-1)^2$. Determine the expressions for the following functions

① $g(x) = 3f(x-1) + 1 = 3\cdot(x-2)^2 + 1$

$f(x-1) = (x-1-1)^2 = (x-2)^2$

② $h(s) = \frac{1}{2} f(s+2) = \frac{1}{2}(s+1)^2$

$f(s+2) = (s+2-1)^2 = (s+1)^2$

③ $r(t) = 0.3 f(t+4) = 0.3 \cdot (t+3)^2$

$f(t+4) = (t+4-1)^2 = (t+3)^2$

④ $s(z) = 10 f(z-3) + 5 = 10 (z-4)^2 + 5$

$f(z-3) = (z-3-1)^2 = (z-4)^2$

(c) $f(x) = x^2$. Determine the expression of all fnct:

① $g(x) = f(3x) = (3x)^2 = 9x^2$

② $h(x) = g(x-1) = 9(x-1)^2$

③ $r(x) = \frac{1}{9}h(x) + 5 = (x-1)^2 + 5$