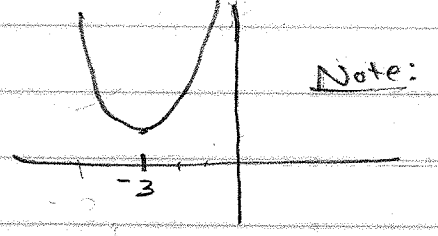
HW Sec 4.2 continued

#2 The order of transformation is given in this problem and we have to produce the function:

a) $f(x) = x^2$ shifted 3 units left and 1 unit up

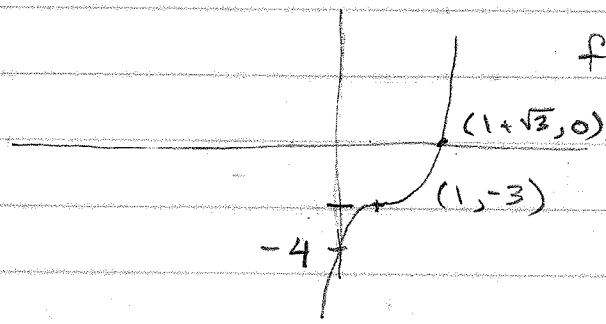
$y = x^2 \longrightarrow (x+3)^2 \longrightarrow (x+3)^2 + 1$



Note: $f(0) = 10$, $f(-6) = 10$ symmetry on $x = -3$

b) $f(x) = x^3$ shifted down 3 units and right 1 unit

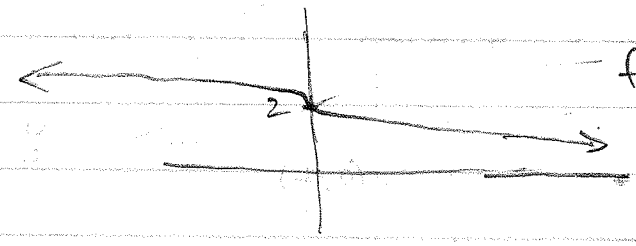
$y = x^3 \longrightarrow x^3 - 3 \longrightarrow (x-1)^3 - 3$



c) $f(x) = \sqrt[3]{x}$ shifted up 2 units and reflected over y-axis

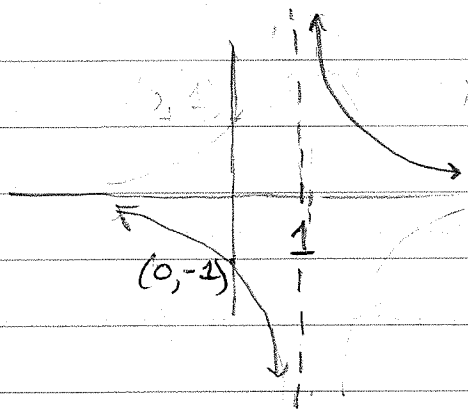
$y = \sqrt[3]{x} \longrightarrow \sqrt[3]{x} + 2 \longrightarrow \sqrt[3]{-x} + 2$

Reflection over y-axis reverses sign of x



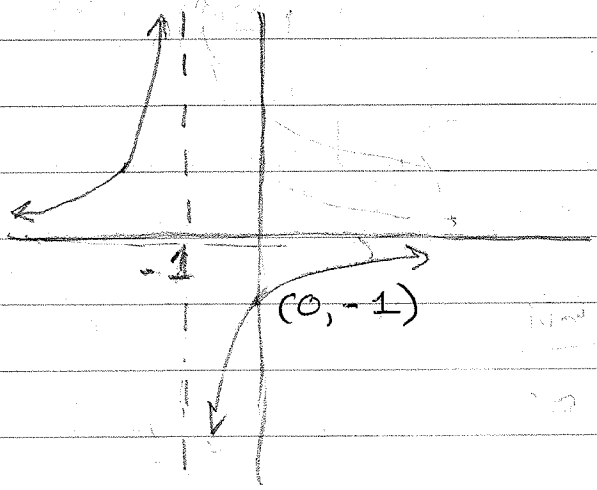
#2 d) $f(x) = \frac{1}{x}$ shifted right 1 unit and reflected over y-axis

$$y = \frac{1}{x} \longrightarrow \frac{1}{x-1} \longrightarrow \frac{1}{-x-1} \text{ or } \frac{-1}{x+1},$$



First transformation

$$y = \frac{1}{x-1}$$

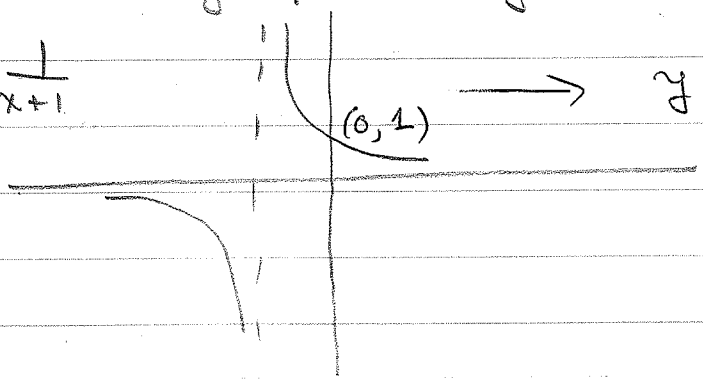


Second transformation

$$y = \frac{1}{-x-1}$$

Note $\frac{1}{-x-1} = \frac{1}{-(x+1)} = -\frac{1}{x+1}$; which indicates a function that is transformed first by a shift 1 unit left, then a reflection across the x-axis! Because $y = \frac{1}{x}$ is such a cool fcn (it's equal to its own inverse), we find this other set of transformations leads to the same graph. Try it:

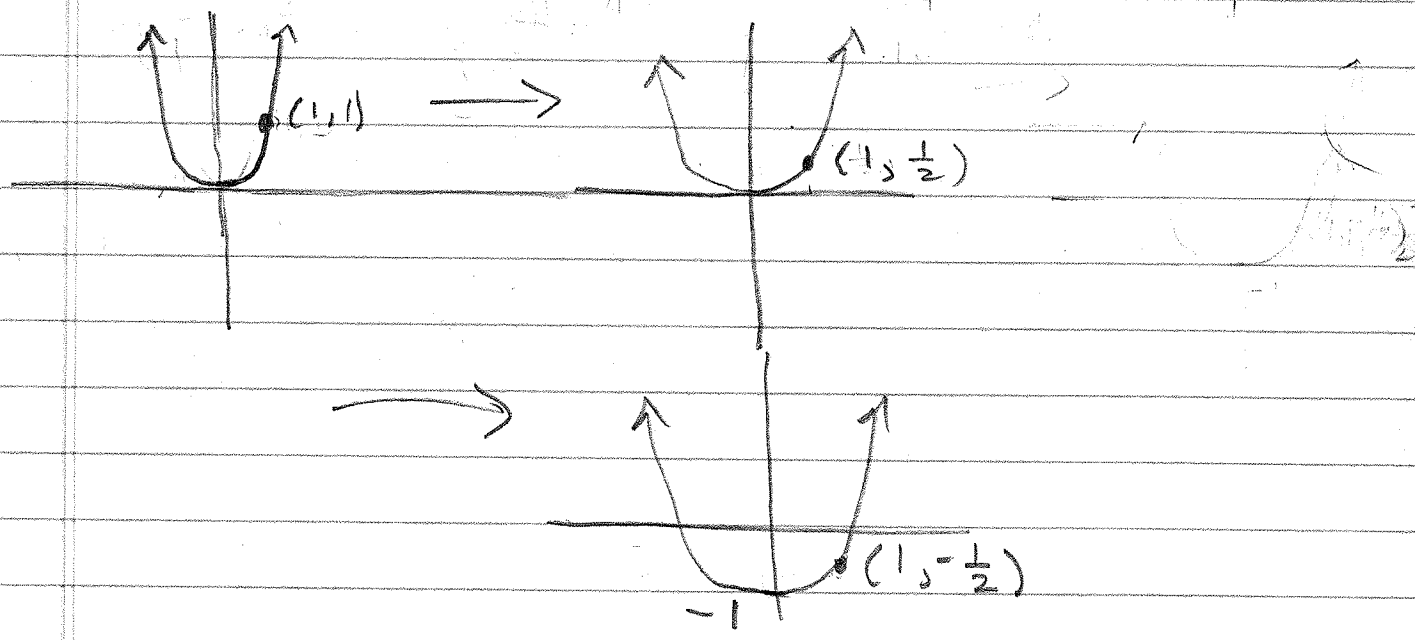
$$y = \frac{1}{x+1} \longrightarrow y = -\frac{1}{x+1}$$



Sec 4.2 HW con'd

#2e) $f(x) = x^4$ vertically compressed by a factor of 2 (squash it), then shift down 1 unit,

$$x^4 \longrightarrow \frac{1}{2}x^4 \longrightarrow \frac{1}{2}x^4 - 1$$



f) $f(x) = \sqrt[5]{x}$ shifted left 2 units, then reflected over x-axis

$$\sqrt[5]{x} \longrightarrow \sqrt[5]{x+2} \longrightarrow -\sqrt[5]{x+2}$$