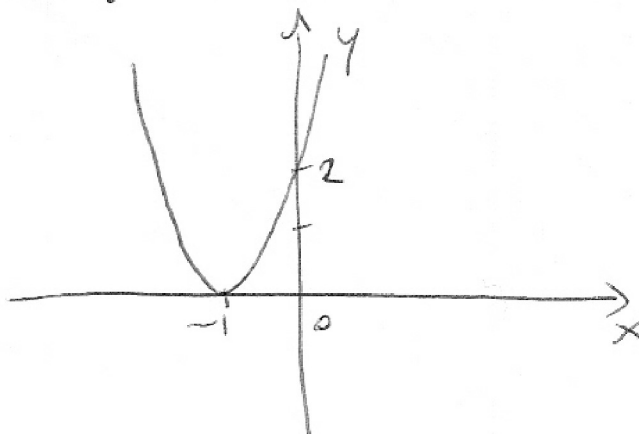


**Problem 9:** Choose  $a, b, c, d$  in  $af(bx + c) + d$  so that the graph of  $f(x) = x^2$  is as in (a),(b),(c) below and sketch the new graph.

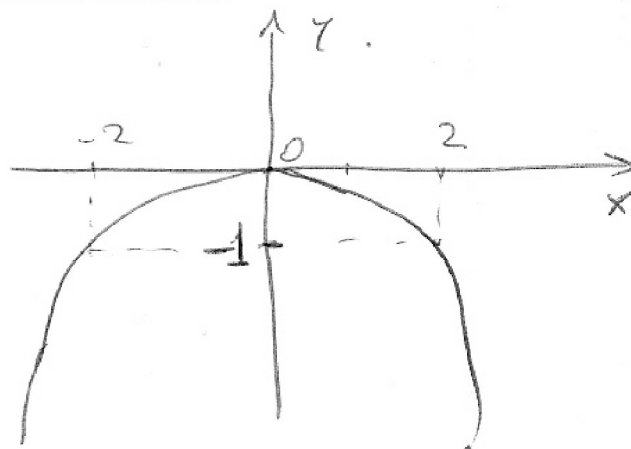
(a) Shifted by 1 to the left and dilated by 2 vertically.

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



(b) Dilated by 2 horizontally and flipped about the  $x$ -axis.

$$-f\left(\frac{x}{2}\right) = -\left(\frac{x}{2}\right)^2$$



(c) Flipped about the  $y$ -axis and shifted down by 1.

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

