$$\min_{x\in\mathbb{R},y\in\mathbb{Z}} (a-x)^2 + 50(y-x^2)^2$$

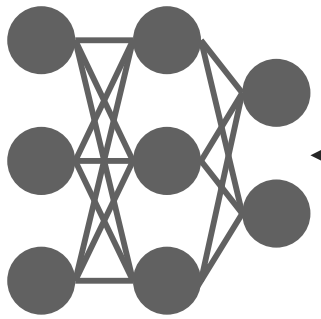
$$s.t.\ y \geq \frac{1}{2}b, x^2 \leq b, x \leq 0, y \geq 0$$

Solution Mapping π_{Θ_1}
as Continuous Relaxation

Input: $a = 3.83, b = 6.04$

Correction Layers φ_{Θ_2}

Hidden State:
$h_x = -0.68, h_y = 9.49$



Neural Network δ_{Θ_2}

Relaxed Solution:
$\bar{x} = -1.17, \bar{y} = 2.98$

Update Continuous Var:
$\hat{x} = \bar{x} + h_x = -1.85$

Round Integer Var:
$\text{Sigmoid}(h_y) \geq 0.5 \rightarrow \hat{y} = \lceil \bar{y} \rceil = 3$

Loss Function