

$$\begin{cases} \min_{x \in \mathbb{R}, y \in \mathbb{Z}} (a - x)^2 + 50(y - x^2)^2 \\ \text{s.t. } y \geq \frac{1}{2}b, x^2 \leq b, x \leq 0, y \geq 0 \end{cases}$$

Input: $a = 3.83, b = 6.04$

Solution Mapping π_{Θ_1}
as Continuous Relaxation

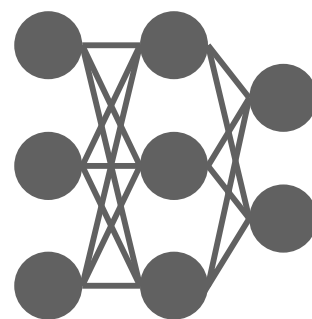
Correction Layers φ_{Θ_2}

Hidden State:

$$h_x = -0.68, h_y = 9.49$$

Relaxed Solution:

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



Neural Network δ_{Θ_2}

Update Continuous Var:

$$\hat{x} = \bar{x} + h_x = -1.85$$

Round Integer Var:

$$\text{Sigmoid}(h_y) \geq 0.5 \rightarrow \hat{y} = [\bar{y}] = 3$$

Loss Function