Problem 3:

a). $\mathrm{ReLu}(x_n^T w_i^*) = x_n^T w_i^*$ ($x_n^T \geq 0$ and $w_i^* \geq 0$)

$f_{w^*}(x_n) = \mathrm{ReLu}(\mathrm{ReLu}(\mathrm{ReLu}(\mathrm{ReLu}(x_n^T w_1^*) \cdot w_2^*) \cdots w_L^*) \cdot w_{Lfn}^*)$

$= x_n^T w_1^* \cdot w_2^* \cdots w_L^* \cdot w_{Lfn}^*$

$= x_n^T w_{NN}^*$ has the same format as $w^T x_n$

so $w_{LS}^* = w_{NN}^*$

$L_{NN}(w_{NN}^*) = L_{LS}(w_{LS}^*)$

b). $x_n \geq 0$ $w_{LS}^* \geq 0$

$\Rightarrow w_{LS}^* x_n \geq 0$ $\quad w_{NN}^* \in R$

$w_{LS}^* x_n \in x_n^T w_{NN}^*$

so $x_n^T w_{NN}^*$ can reach any value that $w_{LS}^* x_n$,

but due to the value limitation of w_{LS}^*, it may not reach to the global minimum. so, $L_{NN}(w_{NN}^*) \geq L_{LS}(w_{LS}^*)$