A Architectural and Training Details

We initialized the Lagrange multiplier of regret (λ_i) as 5, and update it every 6 batches, and we experiment with values for the constant ρ^{rgt} ranging between 0.5 to 2 (reporting the choice that gave the lowest regret). For the IR violation penalty, we initialize the Lagrange multiplier of IR violation (μ_i) as 20, and update the Lagrange multiplier every 6 iterations. μ is initialized as 5, and then incremented by 5 every 5 batches. For distillation, we take a mean squared error loss between the student and teacher's output, and use a multiplier of $\frac{1}{400}$. Specifically, the Lagrange multipliers are updated as follows.

$$\lambda_{i+1} = \lambda_i + \rho^{\text{rgt}} \widehat{\text{rgt}}_i \qquad \rho^{\text{rgt}}_{i+1} = \rho^{\text{rgt}}_i + \rho^{\text{rgt}}_{inc}$$
$$\mu_{i+1} = \mu_i + \rho^{\text{irv}} \, \text{irv}_i \qquad \rho^{\text{irv}}_{i+1} = \rho^{\text{irv}}_i + \rho^{\text{irv}}_{inc}$$

Auction Setting	Inner Product	Relu Stability Regularizer	Embedding Layer
1 Agent x 2 Items	Yes	No	1 hidden layer x 128 units
1 Agent x 2 Items	Yes	Yes	1 hidden layer x 128 units
1 Agent x 2 Items	No	Yes	1 hidden layer x 128 units
2 Agents x 2 Items	Yes	No	2 hidden layer x 128 units
2 Agents x 2 Items	Yes	Yes	2 hidden layer x 128 units
2 Agents x 2 Items	No	Yes	2 hidden layer x 128 units

B Additional Experimental Information

Hardware All certification experiments were conducted on an AMD Ryzen 3600X CPU with 32GB RAM. Training of the network was conducted with a 2080 GPU on a university compute cluster.

Additional experiments Table 4 shows more detailed results for the non-IR-enforcing architecture. IR violations are relatively small, and filtering out these cases (sacrificing revenue) does not harm overall revenue too much.

Table 3 shows the results of scaling experiments for settings with more agents and items, in a setting where payment clipping is applied. Again, increasing the dimensionality of the input space by increasing the number of items seems to impose a greater cost than increasing the number of agents.

Auction setting	Mean solve time (s)	Regret
2x3	109.749 (159.212)	0.027 (0.016)
3x2	3.033 (2.377)	0.019 (0.016)
3x3	59.173 (53.431)	0.022 (0.020)

Table 3: Solve times and regrets for non-IR architecture with clipped payments in larger settings on 250 random points. In general, increasing the number of items significantly slows down certification. Standard deviations are in parentheses.

Auction Setting	% of IR violation	Max IR violation	Mean IR violation	Revenue before enforcing IR	Revenue after enforcing IR
1x2	5.53%	0.0053	0.0001 (0.0003)	0.5738	0.5681
2x2	4.60%	0.0083	0.0002 (0.0007)	0.8874	0.8824

Table 4: IR violation for the 1x2/2x2 auction settings. Note that the mean IR violation is small, and revenue after enforcing IR drops only slightly. The number in parenthesis represents the standard deviation.