Question 3

Payoff matrix

	Nickel	Dime
Nickel	5	-5
Dime	-10	10

Describe the optimal strategy for Row using a linear program.

We can take the above matrix to be A.

$x = [x_1 x_2 \dots x_n]^T$, where Row picks i with probability x_i.

$y = [y_1 y_2 \dots y_n]^T$, where Col picks j with probability y_j.

$x_i \geq 0, y_j \geq 0$

$\sum_i x_i = 1, \sum_j y_j = 1$

Row wants to maximize $y^T A x$.

What is the optimal strategy?

The optimal strategy is to switch between the two 50/50 since it makes it impossible to predict and there is a 50% chance of losing money.

What is the optimal strategy if instead of a nickel or a dime the players hide a a-cent coin or a b-cent coin?

The values don't matter, since for every option Row picks, either possibility adds up to zero. Thus, all that matters is whether Row wins or loses and randomizing between the options minimizes the number of losses.