AM 121: Homework # 5 (Due date Nov 7, Thursday)

The book we refer to is Hillier & Lieberman, *Introduction to Operations Research* (7th Edition).

1. Problem 14.3-1.
2. Mo and Bo each have a quarter and a penny. Simultaneously they each displays a coin. If the coins match Mo wins both coins; if they don't match Bo wins both coins. Determine the optimal strategy for this game.
3. Consider the following simplified version of football. On each play the offense chooses to run or pass. At the same time, the defense chooses to play a run defense or pass defense. The number of yards gained in each play is determined by the reward matrix

		Defense	
		Run Defense	Pass Defense
Offense	Run	1	8
	Pass	10	0

The offense's goal is to maximize the yards gained. The defense's goal is just the opposite.

(a) Does there exist a pure-strategy saddle point?

(b) Find the optimal strategy for the offense and the defense.

(c) Suppose that the effectiveness of a pass against the run defense improves. Then the offense should pass less! Can you give an explanation for this strange phenomenon?

4. Consider a hide-and-seek game with

$$B = [b_{ij}] = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}.$$

Player A picks a row or a cloumn, while player B picks a single component. Suppose player B picks b_{ij}, then player B must pay player A the amount of b_{ij} if player A picks either row i or column j (B hides, A seeks). But the payoff is zero when player A picks a row or a column not containing b_{ij}. Formulate an LP that solves the game.