ANSWERS TO ODD NUMBERED HW PROBLEMS AND ALL REVIEW PROBLEMS

CH 11 GAME THEORY

11.1 Strictly Determined Games

1). a. The game is strictly determined. Optimal strategy for the row player is to always play row 1 and never row 2. In other words, his strategy is $[\ 1 \quad 0\ ]$. The optimal strategy for the column player is to always to play column 1 and never to play column 2. We write it as $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$. When both players play their optimal strategy, the value of the game is 1.

c. The game has no saddle point, therefore, it is not strictly determined.

e. The game is strictly determined. The optimal strategy for the row player is to always play row 4, and never play any other row. We write his strategy as $[\ 0 \quad 0 \quad 0 \quad 1\ ]$. The column player's strategy is $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$. The value of the game is 2.

3). a. $\begin{bmatrix} .05 & .10 \\ -.08 & -.12 \end{bmatrix}$

b. The optimal strategy for the mayor is $[\ 1 \quad 0\ ]$ and for his opponenent is $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$. In other words, both candidates should oppose abortion rights.

11.2 Non-Strictly Determined Games

1). a. The optimal strategy for the row player is $[\ 1/2 \quad 1/2\ ]$. The optimal strategy for the column player is $\begin{bmatrix} 1/2 \\ 1/2 \end{bmatrix}$. The value of the game 0.

c. Optimal strategy for the row player is $[\ 2/7 \quad 5/7\ ]$. The optimal strategy for the column player is $\begin{bmatrix} 6/7 \\ 1/7 \end{bmatrix}$. The value of the game is 16/7.

3). a. $\begin{bmatrix} 2 & -3 \\ -3 & 4 \end{bmatrix}$

b. Optimal strategy for the row player is $[\ 7/12 \quad 5/12\ ]$ The optimal strategy for the column player is $\begin{bmatrix} 7/12 \\ 5/12 \end{bmatrix}$. The value of the game is $-1/12$.

11.3 Reduction by Dominance

1). $\begin{bmatrix} 2 & -1 \\ 0 & 3 \end{bmatrix}$, R = [1/2 1/2 0], C = $\begin{bmatrix} 2/3 \\ 1/3 \end{bmatrix}$, The value = 1

3). $\begin{bmatrix} 1 & -2 \\ -2 & 4 \end{bmatrix}$, R = [2/3 1/3 0], C = $\begin{bmatrix} 2/3 \\ 0 \\ 1/3 \end{bmatrix}$, The value = 0

5). $\begin{bmatrix} 0 & -4 \\ -2 & 4 \end{bmatrix}$, R = [.6 0 .4 0], C = $\begin{bmatrix} 0 \\ .8 \\ .2 \\ 0 \end{bmatrix}$, The value = –0.8

7). $\begin{bmatrix} 2 & -8 \\ 1 & 5 \end{bmatrix}$, R = [0 2/7 5/7 0], C = $\begin{bmatrix} 0 \\ 0 \\ 13/14 \\ 1/14 \end{bmatrix}$, The value = 9/7

11.4 Chapter Review

1). a. R = [0 1], C = $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$, value = 3 b. R = [1 0 0], C = $\begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$ v = –1

c. R = [0 1], C = $\begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$, value = 3 d. R = [0 0 1 0], C = $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$ v = 3

2). a. $\begin{bmatrix} -5 & 10 \\ 5 & 10 \end{bmatrix}$ b. R = [0 1], C = $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$, value = 5 cents

3). a. $\begin{bmatrix} 5 & 30 \\ -5 & 0 \end{bmatrix}$ b. R = [1 0] C = $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$, value = 5%

4). a. $\begin{bmatrix} .14 & .08 & .11 \\ .12 & .11 & .11 \\ .06 & .09 & .10 \end{bmatrix}$ b. [0 1 0], $\begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$, or [0 1 0], $\begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$, value = .11

5). a. $\begin{bmatrix} -.02 & .03 \\ .01 & -.01 \end{bmatrix}$ b. stocks = 2/7, CD's = 5/7

6). a. [1/2 1/2], $\begin{bmatrix} 1/2 \\ 1/2 \end{bmatrix}$, value = 0 b. [5/9 4/9], $\begin{bmatrix} 2/9 \\ 7/9 \end{bmatrix}$, value = 10/9

c. [5/7 2/7], $\begin{bmatrix} 6/7 \\ 1/7 \end{bmatrix}$, value = 23/7 d. [1/2 1/2], $\begin{bmatrix} 4/7 \\ 3/7 \end{bmatrix}$, value = 1

7). 19/8; 14/9 8). $11,000 9). [1/2 1/2], $\begin{bmatrix} 2/3 \\ 1/3 \end{bmatrix}$, v = 0

10). Pass = 9/25, Run = 16/25 11). [10/19 9/19], payoff = 9.58 fish

12). [1 0], payoff = 2 points

11.4 CONTINUED

13). a. $\begin{bmatrix} -3 & 3 \\ 2 & -1 \end{bmatrix}$, $\begin{bmatrix} 0 & 1/3 & 2/3 \end{bmatrix}$, $\begin{bmatrix} 4/9 \\ 0 \\ 5/9 \end{bmatrix}$, value = 1/3

b. $\begin{bmatrix} 4 & 1 \\ 2 & 3 \end{bmatrix}$, $\begin{bmatrix} 0 & 1/4 & 3/4 & 0 \end{bmatrix}$, $\begin{bmatrix} 1/2 \\ 1/2 \\ 0 \end{bmatrix}$, value = 5/2

c. $\begin{bmatrix} 4 & 3 \\ -1 & 4 \end{bmatrix}$, $\begin{bmatrix} 5/6 & 0 & 1/6 & 0 \end{bmatrix}$, $\begin{bmatrix} 1/6 \\ 5/6 \\ 0 \\ 0 \end{bmatrix}$, value = 19/6

d. $\begin{bmatrix} 2 & 1 \\ -2 & 1 \end{bmatrix}$, $\begin{bmatrix} 3/4 & 1/4 \end{bmatrix}$, $\begin{bmatrix} 0 \\ 0 \\ 1 \\ 0 \end{bmatrix}$, value = 1

e. $\begin{bmatrix} 0 & 3 \\ 4 & -7 \end{bmatrix}$, $\begin{bmatrix} 11/14 & 0 & 0 & 3/14 \end{bmatrix}$, $\begin{bmatrix} 10/14 \\ 4/14 \\ 0 \\ 0 \end{bmatrix}$, value = 6/7

f. $\begin{bmatrix} 0 & 2 \\ 2 & 0 \end{bmatrix}$, $\begin{bmatrix} 1/2 & 1/2 & 0 & 0 \end{bmatrix}$, $\begin{bmatrix} 0 \\ 1/2 \\ 1/2 \\ 0 \end{bmatrix}$, value = 1