C: ANSWERS TO SELECTED PROBLEMS

Chapter 10.1, Game Trees, Pure Strategies, and Matrix Games

1. I: {Bluff, Not Bluff}; II: {Call, Not Call},

$$\begin{array}{cc} & \begin{array}{cc} \text{Call} & \text{Not} \end{array} \\ \begin{array}{c} \text{Bluff} \\ \text{Not} \end{array} & \begin{bmatrix} (-5,5) & (5,-5) \\ (1,-1) & (0,0) \end{bmatrix} \end{array} \quad \text{I}$$

3. Let M = in the mall and N = near the mall. Both banks: {M, N},

$$\begin{array}{cc} & \begin{array}{cc} \text{M} & \text{N} \end{array} \\ \begin{array}{c} \text{M} \\ \text{N} \end{array} & \begin{bmatrix} 0.58 & 0.52 \\ 0.65 & 0.45 \end{bmatrix} \end{array} \quad \text{I} \quad \text{II}$$

5. Strategies (AA, A) and (AN, A) correspond to the bath AA.
Strategies (NN, N) and (NA, N) correspond to the path ANA.
Strategy (AA, N) corresponds to the path ANA.
Strategy (AN, N) corresponds to the path ANN.
Strategy (NA, A) corresponds to the path NAA.
Strategy (NN, A) corresponds to the path NAN.

7. [b] both players: {1, 2}, [c]

$$\begin{array}{cc} & \begin{array}{cc} 1 & 2 \end{array} \\ \begin{array}{c} 1 \\ 2 \end{array} & \begin{bmatrix} 5 & -5 \\ -5 & 5 \end{bmatrix} \end{array} \quad \text{I} \quad \text{II}$$

9. [b] both players: {S, D}, [c]

$$\begin{array}{cc} & \begin{array}{cc} \text{S} & \text{D} \end{array} \\ \begin{array}{c} \text{S} \\ \text{D} \end{array} & \begin{bmatrix} (10,10) & (10,1000000) \\ (1000000,10) & (-1,-1) \end{bmatrix} \end{array} \quad \text{I} \quad \text{II}$$

11. [b] both stations: {Switch, Not switch}, [c]

$$\begin{array}{cc} & \begin{array}{cc} \text{S} & \text{N} \end{array} \\ \begin{array}{c} \text{S} \\ \text{N} \end{array} & \begin{bmatrix} 0.70 & 0.65 \\ 0.60 & 0.40 \end{bmatrix} \end{array} \quad \begin{array}{c} \text{WABC} \\ \text{WXYZ} \end{array}$$

Chapter 10.2, Solving Pure-Strategy Matrix Games

1. $(\alpha_3, \beta_2);\ v = 4.$
3. $(\alpha_4, \beta_2);\ v = 5.$
5. $(C, C);\ v = (-10, -10).$
7. $(\alpha_1, \beta_1);\ v = 3.$
9. $(\alpha_3, \beta_4);\ v = 5.$
11. $(\alpha_2, \beta_2);\ v = 4.$
13. (α_1, β_4) or $(\alpha_4, \beta_4);\ v = 3.$
15. Roy should campaign 2 days in northern district and Cal 2 in southern, Roy will get 55%.
17. Station II, no change; station I, lower; 1% goes to station I.
19. (S, D) and (D, S) are the equilibrium pairs.

Chapter 10.3, Solving Mixed-Strategy Games

1. Evil Scientist should go to Paris $\frac{1}{3}$ of the time and to Athens $\frac{2}{3}$ of the time.
James Bond should go to Paris $\frac{2}{3}$ of the time and to Athens $\frac{1}{3}$ of the time.
The value of the game is $-\frac{8}{3}$.
3. The investor should put \$5,000 into stocks and \$25,000 into bonds.
5. $x_1 = \frac{1}{2},\ x_2 = \frac{1}{2},\ y_1 = \frac{1}{4},\ y_2 = \frac{3}{4},\ v = \frac{5}{2}.$
7. $x_1 = 1,\ x_2 = 0,\ y_1 = 1,\ y_2 = 0,\ v = 3.$
9. $x_1 = \frac{13}{51},\ x_2 = \frac{38}{51},\ y_1 = \frac{44}{51},\ y_2 = \frac{7}{51},\ v = \frac{397}{510}.$

11. $x_1 = 0,\ x_2 = \frac{6}{7},\ x_3 = \frac{1}{7},\ y_1 = \frac{6}{47},\ y_2 = 0,\ y_3 = \frac{1}{7},\ y_4 = 0,\ v = \frac{20}{7}$.
13. $x_1 = \frac{1}{2},\ x_2 = 0,\ x_3 = \frac{1}{2},\ x_4 = 0,\ y_1 = 0,\ y_2 = \frac{5}{8},\ y_3 = 0,\ y_4 = \frac{3}{8},\ v = \frac{5}{2}$.
15. $x_1 = \frac{3}{4},\ x_2 = \frac{1}{4},\ x_3 = 0,\ x_4 = 0,\ y_1 = \frac{27}{28},\ y_2 = \frac{1}{28},\ y_3 = 0,\ y_4 = 0,\ v = \frac{19}{40}$.
17. $x_1 = \frac{3}{7},\ x_2 = \frac{4}{7},\ y_1 = \frac{6}{7},\ y_2 = 0,\ y_3 = 0,\ y_4 = \frac{1}{7},\ v = \frac{11}{7}$.
19. Both players show one finger $\frac{1}{2}$ of the time; $v = 0$.
21. The plant should dump 90% of the time in the country and 10% of the time in the stream. The inspector should go to the country 90% of the time and to the stream 10% of the time; v = -$70.
23. The store should use 75% mail and 25% door to door.
The citizens should use 50% mail and 50% door to door.
No, they will only collect 250 signatures.
25. Not drink; expected time of survival is 10 hours.
27. Challenger: prepare for I $\frac{7}{20}$, II $\frac{13}{20}$; Champion: serve I $\frac{1}{4}$, II $\frac{3}{4}$.
29. $500.

Chapter 10.4, Chapter Review

1. Both players' strategies are {N,E}, the payoff matrix is

$$\begin{array}{cc} & \text{II} \\ & \begin{array}{cc} \text{N} & \text{E} \end{array} \\ \text{I}\ \begin{array}{c} \text{N} \\ \text{E} \end{array} & \begin{bmatrix} 200{,}000 & 300{,}000 \\ 75{,}000 & 50{,}000 \end{bmatrix} \end{array}.$$

3. X = purchase 100 g, Y = purchase 200 g, B = busy week, and S = slow week.

$$\begin{array}{cc} & \text{Nature} \\ & \begin{array}{cc} \text{B} & \text{S} \end{array} \\ \text{Store}\ \begin{array}{c} \text{X} \\ \text{Y} \end{array} & \begin{bmatrix} 30 & 50 \\ 100 & -10 \end{bmatrix} \end{array}.$$

5. $(\alpha_1, \beta_3);\ v = 3$.
7. $x_1 = \frac{4}{5},\ x_2 = \frac{1}{5},\ y_1 = \frac{2}{5},\ y_2 = \frac{3}{5},\ v = \frac{18}{5}$.
9. (α_1, β_3) or (α_1, β_5) or (α_4, β_3) or $(\alpha_4, \beta_5);\ v = 1$.
11. $(\alpha_1, \beta_1);\ v = 2$.
13. Build on the north side.
15. Buy 100 gallons 85% of the time.
17. 0.3 paintings, 0.7 books.
19. I: Park; II: Main Street; 0; Yes.
21. $3333.33.