HOMEWORK 1 SOLUTIONS

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Exercise 9.1(1)

The expected payout to Alice is

$$(.5)1 + (.5)4 = 2.5.$$

Exercise 9.1(3)

If Alice gets one of the four aces, her payout is -4; for any of the other 48 cards, her payout is 3. Hence the expected or average payout to Alice is

$$(4/52)(-4) + (48/52)3 = (1/13)(-4) + (12/13)3 = 32/13.$$

Exercise 9.1(5)

If Alice gets one of the four 2's, her payout is 2; if Alice gets one of the four 3's, her payout is 3; etc.; if Alice gets one of the sixteen other cards, her payout is -5. Hence the expected or average payout to Alice is

$$(4/52)(2) + (4/52)(3) + \cdots + (4/52)(10) + (16/52)(-5)$$
$$= (1/13)(2 + 3 + \cdots + 10) + (4/13)(-5) = (54 - 20)/13 = 34/13.$$

Exercise 9.2(3) For

$$A = \left[\begin{array}{cc} 1 & 3 \\ 5 & 2 \end{array} \right]$$

we have the following values.

For "Alice announces a pure strategy," we see that the smallest entry of the first row is 1, and the smallest entry of the second row is 2. Hence Alice picks the second row, and the value of of "Alice announces pure" is 2.

For "Betty announces a pure strategy," we see that the largest entry of the first column is 5, and the largest entry of the second column is 3. Hence the value of of "Betty announces pure" is 3.

Exercise 9.2(6)

For

$$A = \begin{bmatrix} 4 & 1 & 2 \\ 7 & 2 & 3 \\ 5 & 3 & 6 \end{bmatrix}$$

we have the following values.

For "Alice announces a pure strategy," we see that the smallest entry of the first row is 1, of the second row is 2, and of the third row is 3. Hence the value of of "Alice announces pure" is 3.

For "Betty announces a pure strategy," we see that the largest entry of the first column is 7, of the second column is 3, and of the third column is 6. Hence the value of of "Betty announces pure" is 3.

Exercise 9.3

If A' is A with its first two rows exchanged, then A' represents the same game as A, except that Alice's first two pure strategies are exchanged.

Hence all the values of the games are the same, and all of Betty's optimum strategies are the same; all of Alices optimum strategies for games with A' are the same as those for A, except that the first two values (her mixed amounts for the first two rows) are exchanged.

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