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Computer Programming (EE1005)
Homework #8
(Due: May 20)

7.12: Modify the program in Fig. 7.24 so that the card-dealing function deals a five-card poker hand. Then write the following additional functions:
(b) Determine if the hand contains two pairs.

7.13: In the card shuffling and dealing program of Fig. 7.24, we intentionally used an inefficient shuffling algorithm that introduced the possibility of indefinite postponement. In this problem, you will create a high-performance shuffling algorithm that avoids indefinite postponement.

Modify the program of Fig. 7.24 as follows. Begin by initializing the deck array as shown in Fig. 7.1. Modify the shuffle function to loop row-by-row and column-by-column through the array, touching every element once. Each element should be swapped with a randomly selected element of the array.

Print the resulting array to determine if the deck is satisfactorily shuffled (as in Fig. 7.2, for example). You may want your program to call the shuffle function several times to ensure a satisfactory shuffle.

Note that although the approach in this problem improves the shuffling algorithm, the dealing algorithm still requires searching the deck array for card 1, then card 2, then card 3, and so on. Worse yet, even after the dealing algorithm locates and deals the card, the algorithm continues searching through the remainder of the deck. Modify the program of Fig. 7.24 so that once a card is dealt, no further attempts are made to match that card number, and the program immediately proceeds with dealing the next card. In Chapter 10, we develop a dealing algorithm that requires only one operation per card.

Unshuffled deck array

	0	1	2	3	4	5	6	7	8	9	10	11	12
0	1	2	3	4	5	6	7	8	9	10	11	12	13
1	14	15	16	17	18	19	20	21	22	23	24	25	26
2	27	28	29	30	31	32	33	34	35	36	37	38	39
3	40	41	42	43	44	45	46	47	48	49	50	51	52

Fig. 7.1 | Unshuffled deck array.

Sample shuffled deck array

	0	1	2	3	4	5	6	7	8	9	10	11	12
0	19	40	27	25	36	46	10	34	35	41	18	2	44
1	13	28	14	16	21	30	8	11	31	17	24	7	1
2	12	33	15	42	43	23	45	3	29	32	4	47	26
3	50	38	52	39	48	51	9	5	37	49	22	6	20

Fig. 7.2 | Sample shuffled deck array.