

Do 5 of the following problems.

Other interesting problems: 3.2: 5bc, 8, 9, 11, 14; 3.3: 6,10,16,19,20,22,24,29

1. 3.2.5a
2. 3.2.13 (*Hint*: Look at 3.2.12.)
3. 3.3.7
4. 3.3.12
5. 3.3.22
6. A *Latin square* over the alphabet $N = \{1, 2, \dots, n\}$ is an $n \times n$ matrix with entries from N such that each row and each column is a permutation of N . A *partial Latin square* is an $n \times n$ matrix with only the first k rows filled in (but each filled-in row is a permutation of N and no symbol appears twice in any column). Prove that any partial Latin square can be completed to a Latin square; that is, that the remaining $n - k$ rows can be filled in so that the resulting $n \times n$ matrix is a Latin square.