Section 6.6 HW / Discrete Structures II / Fall 2018

Note: All questions below refer to lexicographic order (e.g. "smallest" means "smallest with respect to lexicographic order").

1. Put the following permutations in lexicographic order: 43521, 14523, 43152, 43512, 21345
2. (a) What is the smallest permutation of $\{1, 2, \ldots, 7\}$ that begins with 315? What's the next permutation in lexicographic order?
   (b) What is the largest permutation of $\{1, 2, \ldots, 7\}$ that begins with 315? What's the next permutation in lexicographic order?
3. Consider the permutation 7263541.
   (a) Find the next permutation in lexicographic order.
   (b) Fill in the following blank:
   7263541 is the largest permutation of $\{1, 2, \ldots, 7\}$ in lexicographic order which begins with the string _____.
   (Find the shortest such string that works. What are other strings that would also work?)
4. Find the next three permutations in lexicographic order after 465321.
5. What's the largest 4-combination of $\{1, 2, \ldots, 9\}$ which contains both of the elements 1, 4? What's the next 4-combination in lexicographic order?
6. Find the next three 4-combinations of $\{1, 2, \ldots, 9\}$ after $\{2, 5, 7, 9\}$.
7. Find the next three 5-combinations of $\{1, 2, \ldots, 7\}$ after $\{2, 3, 4, 6, 7\}$.

Answers:

1. 14523, 21345, 43152, 43512, 43521
2. (a) 3152467. The next permutation is 3152476.
   (b) 3157642. The next permutation is 3162457.
3. (a) 7264135
   (b) 7263
4. 512346, 512364, 512436
5. $\{1, 4, 8, 9\}$; next 4-combination is $\{1, 5, 6, 7\}$
6. $\{2, 5, 8, 9\}$, $\{2, 6, 7, 8\}$, $\{2, 6, 7, 9\}$
7. $\{2, 3, 5, 6, 7\}$, $\{2, 4, 5, 6, 7\}$, $\{3, 4, 5, 6, 7\}$