

2.3D2 Solving Permutation Equations for n

Permutation Problems Involving the Terms "at least" or "at most"

Example 1:

To open the garage door of Leah's house, she uses a keypad containing the digits 0 through 9. The password must be at least a 4 digit code to a maximum of 6 digits, and each digit can only be used once in the code. How many different codes are possible?

at least four: 4 or 5 or 6

$$P(4) = \underline{10} \times \underline{9} \times \underline{8} \times \underline{7} = 5040$$

or

$$P(5) = \underline{10} \times \underline{9} \times \underline{8} \times \underline{7} \times \underline{6} = 30240$$

or

$$P(6) = \underline{10} \times \underline{9} \times \underline{8} \times \underline{7} \times \underline{6} \times \underline{5} = 151200$$

$$186480$$

Example 2:

Tiffany needs to create a password for a social networking web site she registered with. The password can use any digits from 0 to 9. A password must be at least 5 characters to a maximum of 7 characters, and each character can be used only once in the password.

(A) What is the total number of characters that Tiffany has to choose from?

10

(B) How many different passwords are possible?

at least 5 / at most 7
5 or 6 or 7

$$P(5) = \underline{10} \times \underline{9} \times \underline{8} \times \underline{7} \times \underline{6} = 30240$$

or

$$P(6) = \underline{10} \times \underline{9} \times \underline{8} \times \underline{7} \times \underline{6} \times \underline{5} = 151200$$

or

$$P(7) = \underline{10} \times \underline{9} \times \underline{8} \times \underline{7} \times \underline{6} \times \underline{5} \times \underline{4} = 604800$$

786240