Use a counting argument to establish each of the following. Make sure you justify each step of your argument.

1. How many lists of length 2 formed from 0, 1, . . . , 9 have exactly one 5?

2. How many lists of length 3 formed from 0, 1, . . . , 9 have exactly one 5?

3. How many 3-digit numbers contain exactly one 5?

4. How many 3-digit numbers contain at least one 5?

5. How many 4-digit numbers contain exactly one 0?

6. How many 4-digit numbers contain at least one 0?

7. How many 10-letter sequences can be formed from A, B, C, D, E?

8. How many 10-letter sequences containing at least one vowel can be formed from A, B, C, D, E?

Answers:

1. 18  2. 243  3. 225  4. 252  5. 2187  6. 2439  7. $5^{10}$  8. $5^{10} - 3^{10}$