

Problem 12

How many 3 digit numbers xyz , with x, y, z all ranging from 0 to 9 have at least 2 of their digits equal. How many have exactly 2 equal digits.

[TYPO: These periods should be question marks.]

Solution

The number of three-digit numbers with $x = y$ is

$$10 \times 1 \times 9 = 90, \quad (\text{any number can be chosen first,} \\ \text{the second number must be the same,} \\ \text{and the third can be any except the chosen number})$$

the number of three-digit numbers with $x = z$ is

$$10 \times 9 \times 1 = 90,$$

the number of three-digit numbers with $y = z$ is

$$9 \times 10 \times 1 = 90,$$

and the number of three-digit numbers with $x = y = z$ is

$$10 \times 1 \times 1 = 10. \quad (\text{any number can be chosen first,} \\ \text{and the second and third numbers must be the same})$$

Add all these to get the number of three-digit numbers that have at least two equal digits.

$$90 + 90 + 90 + 10 = 280$$

Add only the first three results to get the number of three-digit numbers that have exactly two equal digits.

$$90 + 90 + 90 = 270$$