

23. Remove 10^5 numbers in interval.

$$A_1 = \text{multiples of } 10 \quad |A_1| = \left\lfloor \frac{10^5}{10} \right\rfloor = 1000$$

$$A_2 = \text{multiple of } 6 \quad |A_2| = \left\lfloor \frac{10^5}{6} \right\rfloor = 1667$$

$$A_3 = \text{multiples of } 19 \quad |A_3| = \left\lfloor \frac{10^5}{19} \right\rfloor = 527$$

$$A_1 \cap A_2 = \text{Mult. of } 30 \quad |A_1 \cap A_2| = 334$$

$$A_1 \cap A_3 = \text{---} u \text{---} 190 \quad |A_1 \cap A_3| = 53$$

$$A_2 \cap A_3 = \text{---} u \text{---} 114 \quad |A_2 \cap A_3| = 88$$

$$A_1 \cap A_2 \cap A_3 = \text{---} u \text{---} 570 \quad |A_1 \cap A_2 \cap A_3| = 18$$

By PIE there are $1000 + 1667 + 527 - 334 - 53 - 88 + 18$
 $= 2737$ multiples of either.

24) One person gets lemon : 4 choices

Another --- u --- lime : 3 choices

The other two get Orange, then everyone has one drink.

This solution $a+b+c+d = 10$ $z = 8$, with $a, b, c, d \geq 0$

There are $\binom{8+4-1}{8} = \binom{11}{8} = 165$ solutions

Thus $4 \times 3 \times 165 = 1980$ possibilities.