**---------------------------------------PART – A--------------------------------------**

**Problem Statement Overview:**

The problem involves analyzing two six-sided dice (Die A and Die B) to calculate total combinations, list all possible combinations, and determine the probability of each sum.

**Question - 1:**

**How many total combinations are possible? Show the math along with the code!**

**Logic**:

The total number of combinations possible when rolling both Die A and Die B together, we multiply the number of faces on Die A with the number of faces of Die B.

So, the total combinations: 6 \* 6 = 36

**Question - 2:**

**Calculate and display the distribution of all possible combinations that can be obtained when rolling both Die A and Die B together. Show the math along with the code!**

**Logic for generating all possible combinations:**

1. To generate all possible combination pairs, we iterate through each face of Die A and Die B.
2. For example, if Die A has values [1, 2] and Die B has values [3, 4, 5], the pairs generated will be (1, 3), (1, 4), (1, 5), (2, 3), (2, 4), and (2, 5).

**Logic for generating the sums:**

1. For each combination of values (a, b) from Die A and Die B, we compute their sum as a + b.
2. We store these sums in a 2D matrix where each cell (i, j) contains the sum of the ith value from Die A and the jth value from Die B.

**Question - 3:**

**Calculate the Probability of all Possible Sums occurring among the number of combinations from (2).**

**Logic:**

* Utilize the ‘getFreq’ method to calculate the frequency of each sum.
* The probability of each sum is calculated by dividing its frequency by the total number of combinations.
* **Math:** P(sum)=frequency/total number of combinations

**----------------------------------------PART - B--------------------------------------------**

**Question:**

**Now comes the real challenge. You were happily spending a lazy afternoon playing**

**your board game with your dice when suddenly the mischievous Norse God Loki ( You**

**love Thor too much & Loki didn’t like that much ) appeared.**

**Loki dooms your dice for his fun removing all the “Spots” off the dice.**

**No problem! You have the tools to re-attach the “Spots” back on the Dice.**

**However, Loki has doomed your dice with the following conditions:**

**● Die A cannot have more than 4 Spots on a face.**

**● Die A may have multiple faces with the same number of spots.**

**● Die B can have as many spots on a face as necessary i.e. even more than 6.**

**But in order to play your game, the probability of obtaining the Sums must remain the**

**same!**

**So if you could only roll P(Sum = 2) = 1/X, the new dice must have the spots reattached**

**such that those probabilities are not changed.**

**Input:**

**● Die\_A = [1, 2, 3, 4, 5, 6] & Die B = Die\_A = [1, 2, 3, 4, 5, 6]**

**Output:**

**● A Transform Function undoom\_dice that takes (Die\_A, Die\_B) as input &**

**outputs New\_Die\_A = [?, ?, ?, ?, ?, ?],New\_Die\_B = [?, ?,**

**?, ?, ?, ?] where,**

**● No New\_Die A[x] > 4**

**LOGIC:**

**Adjust Die A:**

1. For each face in Die A, if the number of spots exceeds 4, we need to redistribute the excess spots to Die B while ensuring that the probabilities of the sums remain unchanged.

2. To do this, we subtract 4 from the number of spots on the face of Die A and add this difference to the corresponding face of Die B.

3. The value of the face in Die A is then set to 4 to ensure that it doesn't exceed 4 spots.

**Preserve Probability Distribution:**

By adjusting the spots on Die A and redistributing excess spots to Die B, we ensure that the probabilities of obtaining different sums remain the same as before.

**Output:**

The transformed faces of Die A and Die B are stored in arrays New\_Die\_A and New\_Die\_B, respectively.

These arrays are then printed to display the new configuration of the dice.