# 60. n 个骰子的点数

## 题目链接

[Lintcode](https://www.lintcode.com/en/problem/dices-sum/)

## 题目描述

把 n 个骰子扔在地上，求点数和为 s 的概率。

## 解题思路

### 动态规划

使用一个二维数组 dp 存储点数出现的次数，其中 dp[i][j] 表示前 i 个骰子产生点数 j 的次数。

空间复杂度：O(N2)

public List<Map.Entry<Integer, Double>> dicesSum(int n) {  
 final int face = 6;  
 final int pointNum = face \* n;  
 long[][] dp = new long[n + 1][pointNum + 1];  
  
 for (int i = 1; i <= face; i++)  
 dp[1][i] = 1;  
  
 for (int i = 2; i <= n; i++)  
 for (int j = i; j <= pointNum; j++) /\* 使用 i 个骰子最小点数为 i \*/  
 for (int k = 1; k <= face && k <= j; k++)  
 dp[i][j] += dp[i - 1][j - k];  
  
 final double totalNum = Math.pow(6, n);  
 List<Map.Entry<Integer, Double>> ret = new ArrayList<>();  
 for (int i = n; i <= pointNum; i++)  
 ret.add(new AbstractMap.SimpleEntry<>(i, dp[n][i] / totalNum));  
  
 return ret;  
}

### 动态规划 + 旋转数组

空间复杂度：O(N)

public List<Map.Entry<Integer, Double>> dicesSum(int n) {  
 final int face = 6;  
 final int pointNum = face \* n;  
 long[][] dp = new long[2][pointNum + 1];  
  
 for (int i = 1; i <= face; i++)  
 dp[0][i] = 1;  
  
 int flag = 1; /\* 旋转标记 \*/  
 for (int i = 2; i <= n; i++, flag = 1 - flag) {  
 for (int j = 0; j <= pointNum; j++)  
 dp[flag][j] = 0; /\* 旋转数组清零 \*/  
  
 for (int j = i; j <= pointNum; j++)  
 for (int k = 1; k <= face && k <= j; k++)  
 dp[flag][j] += dp[1 - flag][j - k];  
 }  
  
 final double totalNum = Math.pow(6, n);  
 List<Map.Entry<Integer, Double>> ret = new ArrayList<>();  
 for (int i = n; i <= pointNum; i++)  
 ret.add(new AbstractMap.SimpleEntry<>(i, dp[1 - flag][i] / totalNum));  
  
 return ret;  
}