

Solutions to Math 481 REAL QUIZ #1

1. Find the probability of throwing a sum of 6 with four unbiased dice.

Sol. to 1: The sample space has 6^4 members all vectors of the form (i_1, i_2, i_3, i_4) with $1 \leq i_1, i_2, i_3, i_4$.

To find how many such vectors there are such that the add-up to 6, i.e. $i_1 + i_2 + i_3 + i_4 = 6$ we first by inspection look at those that are weakly decreasing

- $(3, 1, 1, 1)$ that has $\binom{4}{1} = 4$ permutations, namely

$$(3, 1, 1, 1) \quad , \quad (1, 3, 1, 1) \quad , \quad (1, 1, 3, 1) \quad , \quad (1, 1, 1, 3) \quad .$$

- $(2, 2, 1, 1)$ that has $\binom{4}{2} = 6$ permutations, namely

$$(2, 2, 1, 1) \quad , \quad (2, 1, 2, 1) \quad , \quad (2, 1, 1, 2) \quad , \quad (1, 2, 2, 1) \quad , \quad (1, 2, 1, 2) \quad , \quad (1, 1, 2, 2) \quad .$$

So $|E| = 10$. The desired probability is $\frac{10}{6^4} = \frac{5}{648}$.

Ans. to 1: The probability of throwing a sum of 6 with four unbiased dice is $\frac{5}{648}$.

Note: It is OK to leave it as $\frac{10}{6^4}$.