

# Discrete Maths

21

5 Describe the sample space of 4 tosses

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H/T H/T H/T H/T

$$2 \times 2 \times 2 \times 2 = 2^4 = 16$$

$$|S| = 16$$

{ HHHH, ..., TTTT }

Ex Describe the sample space of  
rolling (a dice 4 times) / (4 dice).

			
1	1	1	1
2	2	2	2
⋮	⋮	⋮	⋮
6	6	6	6

$$6 \times 6 \times 6 \times 6 = 6^4 = 1296$$

$$|S| = 1296$$

$$S = \{1111, \dots, 6666\}$$

Ex Fill in two spaces by any cards from pack of cards (52).



← Without replacement

that is, once taken first card only 51 are left to choose from for second space.

52 x 51 ways,  
permutation

$${}_n P_2 \Rightarrow {}_{52} P_2 \Rightarrow \frac{52!}{(52-2)!} = 52 \times 51$$

Order of importance.

If order is not important  
we are taking combination  
that is

$$\Omega(2) \Rightarrow \frac{5!}{(5-2)! \cdot 2!}$$

$$= \frac{5! \times 5!}{2}$$

$$= 2 \times 5!$$

no replacement. That is  
once taken and not kept back.

Ex.

Sample space English alphabet

$$S = \{a, b, \dots, z\}$$

$$|S| = 26$$

Sample space of vowels

$$S = \{a, e, i, o, u\}$$

$$|S| = 5$$

Sample space of consonants

$$|S| = 21$$

# deck of cards 52

Four suits

spade

club

heart

diamond

two colors

black  
26

red  
26

types

Ace A

2 ... 10

Jack

Queen

King

$13 \times 4$

$= 52$

Sample space of  
deck of cards

$$|\Omega| = 52$$

















