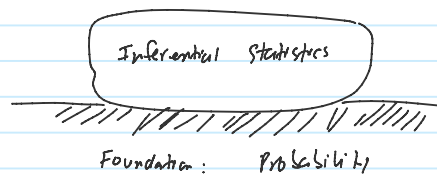
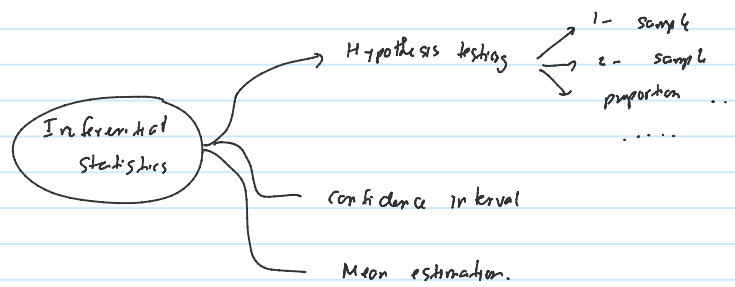


# Sample Spaces and Probabilities

Thursday, March 9, 2023

1:54 PM



## 1. Sample spaces.

(a) Experiment: Tossing a coin

All the possible outcomes:  $\{\text{Head, Tail}\}$

Sample space =  $\{\text{Head, Tail}\}$

(b) Roll a die:

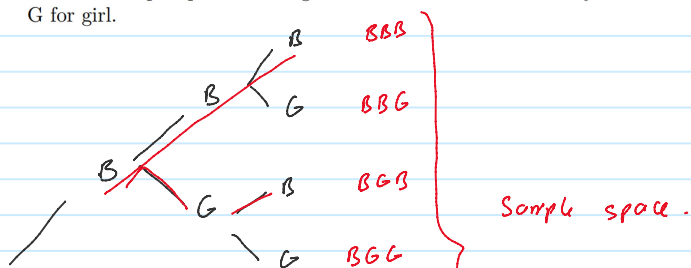
Sample space =  $\{1, 2, 3, 4, 5, 6\}$

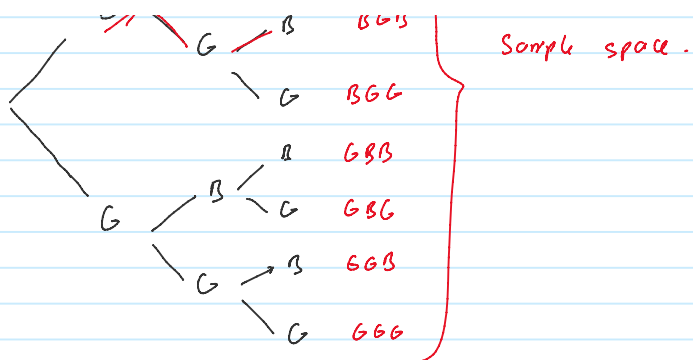
(c) Roll 2 die:

Sample space =

$\left\{ \begin{array}{cccccc} (1,1) & (1,2) & (1,3) & (1,4) & (1,5) & (1,6) \\ (2,1) & (2,2) & (2,3) & (2,4) & (2,5) & (2,6) \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ (6,1) & (6,2) & (6,3) & (6,4) & (6,5) & (6,6) \end{array} \right\}$

1. Find the sample space for the gender of the children if a family has three children. Use B for boy and G for girl.





## 2. Probabilities

① Events:

the gender of the children if a family has three children.

Event 1: All the children have the same gender.  $\{ GGG, BBB \}$

Event 2: At least 2 children are girls

$\{ BGG, GGG, GGB, GGB \}$

Event 3: The second child is a boy

$\{ GBB, GBB, BBB, BBG \}$

Event 4: Two boys in a row

$\{ BBG, GBB, BBB \}$

We have the concept: probability of an event (event is a subset of sample space)

Prob of event 4 or Prob of having 2 boys in a row:

$$= \frac{\text{The number of possible outcomes of the event}}{\text{The total number of all possible outcomes}} = \frac{3}{8}$$

② Find the prob. of having an even number when rolling a die.

Even number =  $\{ 2, 4, 6 \}$  (3 outcomes)

Sample space =  $\{ 1, 2, 3, 4, 5, 6 \}$  (6 outcomes)

$$\Rightarrow \text{Prob.} = \frac{3}{6} = 50\%$$

③ Find the prob of getting a sum of 7 when rolling 2 dice.

Q) Find the probability of getting a sum of 7 when

rolling 2 dice.

sum of 7 =  $\{ (1,6), (6,1), (2,5), (5,2), (3,4), (4,3) \}$   
or 6 outcomes

Total possible outcomes is 36

$$\text{Prob} = \frac{6}{36} = \frac{1}{6}.$$