Topic: Measuring Uncertainty with Probability

Probability - Exercise

School of Mathematics and Applied Statistics



Recall: Equally likely outcomes

When all possible outcomes are equally likely,

$$P(E) = \frac{n(E)}{n(S)}$$

where n(E) = no. of outcomes in E; and n(S) = no. of outcomes in S

Recall: Conditional Probability

Recall:

Definition: The probability of an event (A) occurring when it is known that some event (B) has already occurred is called a **conditional probability**.

• The **conditional** probability of event A given that event B has occurred is

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

Exercise: Probability Solution

Exercise: Two fair dice are rolled.

- Oraw up a table to show all the possible outcomes of the sums.
- What is the probability of getting a 1 on Die 1 and a 3 on Die 2?
- What is the probability that the sum of faces is 4?
- Given that the sum is 4, what is the probability of "doubles"?

Exercise: Probability Solution

Table of possible outcomes of the sums. ○ 2 ·



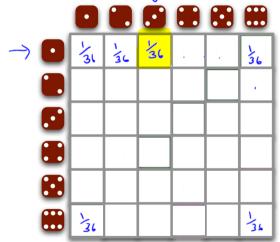
36 possible

Diel

Exercise: Probability Solution cont.

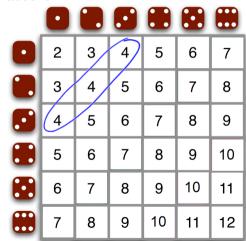
What is the probability of getting a 1 on Die 1 and a 3 on Die 2?

$$P(1,3) = \frac{1}{36}$$



Exercise: Probability Solution cont.

What is the probability that the sum of faces is 4?



Exercise: Probability Solution cont.

Given that the sum is 4, what is the probability of "doubles"?

$$P(doubles \mid sum is 4)$$

$$= P(A \mid B)$$

$$P(A \mid B) = \frac{P(A \mid A \mid B)}{P(B)}$$

$$= \frac{1/36}{1/12}$$

$$= \frac{1}{36} \times \frac{11}{1}$$

$$= \frac{1}{3}.$$

obability of doubles:						
	•		lacksquare			
	2	3	4	5	6	7
	3	4	5	6	7	8
lacksquare	4	5	6	7	8	9
	5	6	7	8	9	10
	6	7	8	9	10	11
	7	8	9	10	11	12