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'And' probabilities

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The probability two outcomes for independent events both occur can be found by multiplying their probabilities.

$$P(\text{A and B}) = P(A) \times P(B)$$

Example with coins

What is the probability of throwing two heads in a row when tossing a coin?

This is the same as asking what the probability that the first coin tossed will be head AND the second coin tossed will be a head.

$$\begin{aligned} P(\text{two heads}) &= P(\text{first is head}) \times P(\text{second is head}) \\ &= \frac{1}{2} \times \frac{1}{2} \\ &= \frac{1}{4} \end{aligned}$$

So the probability that of tossing two heads in a row is $\frac{1}{4}$.

Example with a jar

A jar contains 2 red balls and 4 green balls. What is the probability that two balls selected at random from the jar are both green?

Each ball is equally likely to be selected from the jar so we can work out the probability of the first ball selected

being green.

$$\begin{aligned} P(\text{first ball is green}) &= \frac{\text{number of green balls}}{\text{total number of balls}} \\ &= \frac{4}{6} \\ &= \frac{2}{3} \end{aligned}$$

Here is where we need to be careful, once we have taken 1 green ball out of the jar, the jar contains only 3 green balls and 2 red balls so

$$\begin{aligned} P(\text{second ball is green}) &= \frac{\text{number of green balls remaining}}{\text{total number of balls remaining}} \\ &= \frac{3}{5} \end{aligned}$$

Now we can say that

$$\begin{aligned} P(\text{both green}) &= P(\text{first is green}) \times P(\text{second is green}) \\ &= \frac{2}{3} \times \frac{3}{5} \\ &= \frac{2}{5} \end{aligned}$$

So the probability that of picking out two green balls is $\frac{2}{5}$.

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Comments (2):

1. good

amanmeshram on 7 Dec 2009 ([permalink](#))

2. Amazingly explained.....WoW

hbs on 11 May 2011 ([permalink](#))

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