Name: _____

MA162-020
2010-07-29

Quiz 7.2: Probability

1. Suppose your experiment is to flip a penny and a nickel to see which side lands face up.

(a) What is the sample space and what are the probabilities of each sample point?

(b) What is the probability of the event "getting two tails"?

(c) What is the probability of the event "getting more heads than tails"?

(d) What is the probability of the event "getting both a head and a tail"?

2. Suppose the experiment is to flip a penny, a nickel, and a dime.

(a) What is the sample space and what are the probabilities of each sample point?

(b) What is the probability of the event "getting two tails"?

(c) What is the probability of the event "getting more heads than tails"?

(d) What is the probability of the event "getting both a head and a tail"?

3. Suppose the experiment is flipping two indistinguishable pennies.

(a) What is the sample space and what are the probabilities of each sample point?

(b) What is the probability of the event "getting two tails"?

(c) What is the probability of the event "getting more heads than tails"?

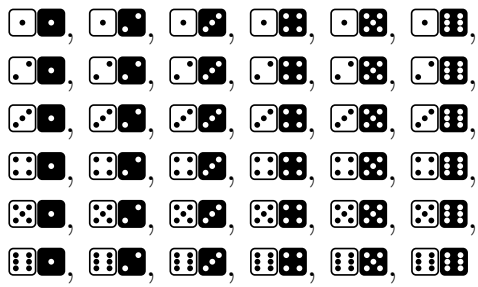
(d) What is the probability of the event "getting both a head and a tail"?

Examples 7.2: Probability

If a sample space has only finitely many sample points, then one can define the **probability** of any particular sample point occurring. The probability of an event is the sum of the probabilities of the sample points it contains. A **uniform sample space** is where every sample point has equal probability. The probability of the entire sample space (the probability that "something, anything happens") is 100% = 1.00. In a uniform sample space S, the probability of any sample point occurring is $1/n(S)$ and the probability of any event is:

$$n(E)/n(S)$$

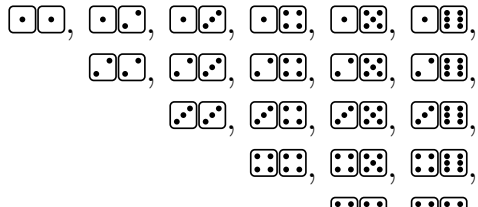
Example (uniform): Suppose both a white and a black (six-sided, fair) die are rolled for an experiment. The sample space consists of 36 points. Each sample point is equally likely, $\frac{1}{36}$. The chance of rolling an "eight" is just $\frac{5}{36}$ since there are five ways out of thirty six ways to roll an eight.



The chance of rolling doubles is

$$\frac{n\left(\{\boxdot\blacksquare, \boxdot\blacksquare, \boxdot\blacksquare, \boxdot\blacksquare, \boxdot\blacksquare, \boxdot\blacksquare\}\right)}{36} = \frac{6}{36} \approx 17\%$$

Example (non-uniform): Suppose two white (six-sided, fair) dice are rolled for an experiment. The sample space consists of the 21 points.



When you roll the two dice, they roll around all over the place, and you can't tell the difference between $\boxdot\boxdot$ and $\boxdot\boxdot$ or even $\begin{smallmatrix}\boxdot\\\boxdot\end{smallmatrix}$ and $\begin{smallmatrix}\boxdot\\\boxdot\end{smallmatrix}$.

However, the color of the dice should not affect the probability of rolling an "eight", that is, where the sum of the dice is "eight". What are the probabilities of each sample point?