Black Hills Math Circle

Topic: Probability

Meeting Number:6

Date:1/12/2013

Consider a game in which the outcome is uncertain and consider some property or attribute of an outcome. Let A be the collection of outcomes having that property and Ω be collection of all outcomes of the game. Let $|A|$ denote the number of outcomes in A and $|\Omega|$ denote the number of outcomes in Ω, the $P(A) = \frac{|A|}{|\Omega|}$.

Problem 1:

Consider four distinguishable coins (e.g. a penney, a nickel, a dime, and a quarter). If the four coins are tossed simultaneously and A consists of all outcomes having two heads, determine $P(A)$.

Problem 2:

If four coins of like kind are tossed simultaneously and A consists of all outcomes having three heads, determine $P(A)$.

Problem 3:

Consider a class of 12 students. Each student has a birthday that can be any one of the days numbered $1, 2, \ldots, 365$. What are the chances that no two of them will have the same birthday ?

Problem 4:

Suppose a poker hand of 5 cards is dealt from a well shuffled deck of 52 playing cards. What is the probability of getting a royal flush; i.e. $10, J, Q, K, A$ of the same suit ?

Problem 5:

Suppose a poker hand of 5 cards is dealt from a well shuffled deck of 52 playing cards.

What is the probability of getting a full house; i.e. 3 *cards with the same face value and* 2 *cards with the same face value ?*

Problem 6:

Suppose a poker hand of 5 *cards is dealt from a well shuffled deck of* 52 *playing cards.What is the probability of getting a straight flush; i.e.* 5 *cards in sequence in the same suit with the ace counting as a* 1 *or as the highest card ?*

Problem 7:

A drawer contains red socks and black socks. When two socks are drawn at random, the probability that both are red is $\frac{1}{2}$*. (a) How small can the number of socks in the drawer be ? (b) How small if the number of black socks is even ?*

Problem 8:

A three-person jury has two members each of whom independently has a probability p *of making the correct decision and a third member who flips a coin for each decision (majority rules). One person jury has probability* p *of making correct decision. Which jury has the better probability of making correct decision ?*