Conditional Probability

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Class Discussion

Conditional Probability.

Warm Up

Exercise 1. Tanya has 4 sesame and 3 garlic bagels at home. While packing for her hiking trip she randomly picks 3 bagels. What is the probability that she picked 2 sesame and 1 garlic bagel?

Exercise 2. What is the most probable number of heads when you flip 6 coins?

Probability

Exercise 3. AMC. Diana and Apollo roll a standard die obtaining a number at random from 1 to 6. What is the probability that Diana's number is larger than Apollo's number?

Exercise 4. AMC. A point is chosen at random from within a circular region. What is the probability that the point is closer to the center of the region than it is to the boundary of the region?

Exercise 5. AMC. Tamika selects two different numbers at random from the set 8, 9, 10 and adds them. Carlos takes two different numbers at random from the set 3, 5, 6 and multiplies them. What is the probability that Tamika's result is greater than Carlos' result?

Exercise 6. For each positive integer n the mean of the first n terms of a sequence is $n + 1$. What is 2009th term of the sequence?

Exercise 7. Three fair coins are tossed at once. For each head that results, one fair die is rolled. What is the probability that the sum of the die rolls is 4?

Exercise 8. AMC. In how many ways can you add a fifth number to the set of numbers $\{3, 6, 9, 10\}$ to make the mean of the set of five numbers equal to its median.

Exercise 9. AMC. Five test scores have a mean of 90, a median of 91 and a mode of 94. What is the sum of the lowest two scores?

Challenge Problems

Exercise 10. How many people must be gathered together in a room, before you can be certain that there is a greater than 50/50 chance that at least two of them have the same birthday?

Exercise 11. Suppose you're on a game show, and you're given the choice of three doors: Behind one door is a car; behind the others, goats. You pick a door. The host always opens a different door from the door chosen by the player and always reveals a goat by this action because he knows where the car is hidden. So he opens another door, which has a goat. He then says to you, "Do you want to pick door No. 2?" Assuming your want the car, is it to your advantage to switch your choice?

Exercise 12. You have a hat in which there are three pancakes: One is golden on both sides, one is brown on both sides, and one is golden on one side and brown on the other. You withdraw one pancake, look at one side, and see that it is brown. What is the probability that the other side is brown?

Exercise 13. You have 100 white balls and 100 black balls. You need to put all of them in two bags. Your worst enemy will pick a bag at random and then will pick a random ball out of the bag. You want him to pick a white ball. How can you put the balls into the bags to maximize your chances of success?