

HMC Math 62- Probability & Statistics

QUIZ I: Due Friday, June 11, 2004 (1 hour quiz)

0: (1 Point) Put your name on your quiz.

1: (14 Points) Given events A and B in a sample space, prove or disprove each of the following:

(i): If A and B are independent, then A and B^c are independent.

(ii): If $P(A) = 1$, then A and B are independent. HINT: Consider $A \cup B$.

(NOTE: $P(A) = 1$ does *not* mean that $A = S$.)

2: (14 Points) I have three dice in my pocket... one 6-sided, one 12-sided and one 20-sided. Suppose I grab one at random and roll it, and it shows a 3.

(i): Given this, what is the probability that I grabbed the 6-sided die? The 12-sided die? The 20-sided die?

(ii): If I roll this same die again, what is the probability that I roll a 12? Since this is the same die, you'll want to use your answer from (i). (If you didn't get (i), use $\frac{1}{3}, \frac{1}{3}, \frac{1}{3}$ instead.)

(NOTE: You may leave your answer as a sum of fractions.)

3: Mmmmm... Ice Cream! (21 Points) Suppose I have 15 flavors of ice cream, and am giving out one scoop of each. I can either give out the ice cream in bowls or cones. If I put the ice cream in a bowl, order is not important (because you can eat your scoops in any order you want); but if I put the ice cream on a cone, order is important (because you should really eat the top scoop first).

(i): If I have 3 distinct bowls, in how many ways can I distribute the 15 scoops if every bowl gets 5 scoops?

(ii): If I have 3 distinct cones, in how many ways can I distribute the 15 scoops if every cone gets 5 scoops?

(iii): If I have 3 distinct bowls, and any bowl can hold any number of scoops, in how many ways can I distribute the 15 scoops among the 3 bowls?

BONUS: (5 Points) If I have 3 distinct cones, and any cone can hold any number of scoops, in how many ways can I distribute the 15 scoops among the 3 cones?