STAT/MA 41600

In-Class Problem Set #2: August 28, 2015

1. Consider a collection of 9 bears. There is a family of red bears consisting of one father bear, one mother bear, and one baby bear. There is a similar green bear family, and a similar blue bear family. We draw 5 consecutive times from this collection *without replacement* (i.e., not returning the bear after each draw). We keep track (in order) of the kind of bears that we get.

1a. Let A_j denote the event that exactly j of the red bears are chosen during the 5 draws. Do the events A_0, A_1, A_2, A_3 constitute a partition of the sample space? (As always, be sure to justify your answer.)

1b. Find the probabilities of each of these four events.

2a. Flip a fair coin ten times. Find the probability that there are at least three heads among the ten flips.

2b. Flip a fair coin until the third head appears, and then stop right after that flip. What is the probability that it took you ten or more flips to accomplish this?

3. Consider events A_1, A_2, A_3 with the following properties:

$P(A_1) = P(A_2) = P(A_3) = 1/4$

$P(A_1 \cap A_2) = P(A_1 \cap A_3) = P(A_2 \cap A_3) = 1/8$

$P(A_1 \cap A_2 \cap A_3) = 1/16$

3a. Find the probability $P(A_1 \cup A_2 \cup A_3)$.

3b. Do the events A_1, A_2, A_3 constitute a partition of the sample space? (As always, be sure to justify your answer.)

3c. Let $A_4 = (A_1 \cup A_2 \cup A_3)^c$. What is the probability of the event A_4?

3d. Do the events A_1, A_2, A_3, A_4 constitute a partition of the sample space? (As always, be sure to justify your answer.)

4. Consider a red 4-sided die (numbered 1, 2, 3, 4), a green 4-sided die (also 1 to 4), and a blue 6-sided die (1 to 6).

Let A_j denote the event that the sum of the three dice is j. Find $P(A_j)$ for $j = 3, \ldots, 14$.