Introduction to Probability:

Suppose you roll a die twice, and are interested in the following events:

- A_1 = roll two evens

- A_2 = roll two odds

- A_3 = roll one odd and one even (in either order)

- A_4 = roll a sum of 7

- A_5 = roll doubles

(1) Compute the probability of each of the five events. (Hint: It may help you to make a table of all of the possible outcomes in your sample space)

(2) Are there any disjoint events whose probabilities add up to 1?

(3) Give me an example of two events that are mutually exclusive.

(4) Compute $P(A_1 \mid$ first roll is even)

(5) Compute $P(A_4 \mid$ first roll is a 3)

Suppose you roll two separate dice; one red and one green. For each of the following, determine whether events A and B are mutually exclusive, independent, both, or neither.

a) A = red die is a 3; B = red die is a 6.

b) A = red die is a 3; B = green die is a 6.

c) A = red die and green die sum to 4; B = red die is a 3.

d) A = red die and green die sum to 4; B = red die is a 4.

Compute P(red die is a 3). Then compute P(red die is a 3 | green die is a 6). What do you notice and why do you think it happens? (Hint: look back at (a); what is true about these two events?)

Compute P(red die and green die sum to 4). Then compute P(red die and green die sum to 4 | red die is a 3). What do you notice, and why do you think this happens? (Hint: look back at (c); what is true about these two events?)