Week 7: Cartoon Guide Questions

Please read pages 37–45 of the Cartoon Guide with your group. The reading is dense! Do not rush through it; read together with your groupmates **first**, then answer the following questions.

Question 1. Suppose that E and F are events from the same sample space S. For each of the following sets, draw a Venn diagram that represents it in the most general scenario (where both E and F are compound, they might share some common events, and neither one comprises all of S itself):

(a) E and F

(b) E or F

(c) E or F but not both (sometimes this is written "E xor F", where "xor" is called the "*exclusive or*".)

(d) Not F (sometimes written F^C)

(e) Not E

(f) E but not F

(g) F but not E

(h) E or not F

(i) F or not E

Question 2. Assume that E and F are the same events described on Wednesday's quiz (they're given the names "F" and "E" there). Write sets (you may always make strategic use of the ellipsis $\cdots$ in writing the lists) corresponding to each of the following:

(a) E or F but not both (sometimes this is written "E xor F", where "xor" is called the "*exclusive or*".)

(b) F^C

(c) E^C

(d) E but not F

(e) F but not E

(f) E or not F

(g) F or not E

Question 3. If A and B are independent events and $P(A) = 0.20$ and $P(B) = 0.45$, find:

(a) $P(A \text{ and } B)$

(b) $P(A|B)$

(c) $P(B|A)$

(d) $P(A^C \text{ and } B)$

(e) $P(A \text{ and } B^C)$

(f) $P(B^C|A^C)$

(g) $P(A^C \text{ and } B^C)$

(h) $P(A \text{ or } B)$

Question 4. Suppose F is the event that it is dark outside in North Adams, and suppose that E is the event that it is midnight in North Adams, MA. Using words, describe what is represented by $P(F|E)$, and do the same for $P(E|F)$. Which one of the two do you think is larger? Why?

Question 5. The probabilities that it will rain or snow in a given city on Christmas Day, on New Year's Day, or on both days, are $P(C) := 0.60$, $P(N) := 0.60$, and $P(C \cap N) := 0.42$. Check whether N and C are independent.

Question 6. Let L be the event that a driver has gotten his or her license in the last year, let M be the event s/he is married, and G be the event that s/he has a good driving record. Using these symbols, express the probability that...

    (a) A driver who has a good record is married;

    (b) A driver who is unmarried has gotten his or her license in the last year

State in words what probabilities are expressed by...

    (a) $P(M|L)$

    (b) $P(G^C|M)$

Question 7. Bonus: What is the meaning of the French word *chevalier*? Do the words of the lady in the cartoon at the top of page 37 seem awkward?