

CS 109 Quiz 1 (30 points):

1. [14 points] True or False (2 points correct, 1 point blank, 0 points guess). Note that true means **always** true. Assume A and B are events with **nonzero** probability.
 - a. $\Pr(A|B) + \Pr(A^c|B) = 1$.
 - b. $\Pr(A|B) + \Pr(A|B^c) = 1$.
 - c. $\Pr(A \cap B) + \Pr(A \cap B^c) = 1$.
 - d. $\Pr(A \cap B) = \Pr(A) \Pr(B)$.
 - e. If $\Pr(A) = 0.4$ and $\Pr(B) = 0.6$, then $A = B^c$.
 - f. Suppose $\Pr(A) = 0.2$, $\Pr(B) = 0.3$, and $\Pr(A \cup B) = 0.44$. Then, A and B are independent.
 - g. A and B can be both mutually exclusive and independent.
2. [9 points] Definitions (3 points each).
 - a. Cite Bayes Theorem. $\Pr(A|B) =$.
 - b. Cite the Law of Total Probability for $\Pr(A)$ in terms of the partition B, B^c . $\Pr(A) =$.
 - c. Cite the Chain Rule for three events. $\Pr(A \cap B \cap C) =$.
3. [7 points] Short Answer (7 points).
 - a. Suppose there are 7 blue fish, 4 red fish, and 8 green fish in a large fishing tank. You drop a net into it and end up with 6 fish. What is the probability you get 2 of each color?

Take-Home Problem

A, B, C, D, E, F, and G want to sit in a row of 9 chairs for a picture (note: there are only 7 of them). A and B cannot sit next to each other, since they are enemies. C and D must sit next to each other, since they are dating. Children E and G must sit immediately adjacent to their parent F. How many ways can they sit in a row?