Quiz 15 Solutions

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This quiz does not count towards your grade. It exists to simply gauge your understanding. Treat this as though it were a portion of your midterm or final exam. "Intuition Practice" might be tricky; watch out for subtleties. "Proofs" will be challenging to start; develop an arsenal of *approaches* to starting a problem.

1 Intuition Practice

For each of the following questions, choose **True** or **False**.

1. (True or False) A random variable is a function mapping events to the real numbers.

   Solution: True. More precisely, $f : X \to \mathbb{R}$

2. (True or False) A random experiment is uniquely defined by a set of probabilities.

   Solution: False. A random experiment must also define the sample space, or the set of possible outcomes. This seems pedantic, but when it comes to the exam, don't forget to specify both.

3. (True or False) Consider non-disjoint events $X, Y \in \Omega$. Then, $\sum_x P(X|Y) = 1$

   Solution: True

4. (True or False) Consider non-disjoint events $X, Y \in \Omega$. Then, $\sum_y P(X|Y) \leq \sum_x P(X|Y)$.

   Solution: False. We don't know anything about a summation over the conditioned variable.

5. (True or False) It is possible to construct events X and Y such that $P(X|Y) = Pr(X,Y)$.

   Solution: True. Any $P(Y) = 1$, by the definition of conditional probability, will satisfy this.