



# Conditional probability

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- How is the conditional probability that  $X = 1$  given  $Y = 2$  calculated?
- In introducing this definition I said we needed two functions. Explain in your own words why two functions are required in order to understand conditional probability. What purposes do these functions serve?
- Explain what we mean when we say that a set of subsets are disjoint. Explain why the set of outcomes for which the random variable,  $X$ , equals one must be disjoint from the set of outcomes for the set of outcomes for which the random variable  $X$  equals 2. Hint: what is the conditional probability  $P(X = 1|X = 2)$  equal to?
- The inclusion exclusion principle is an important result in probability theory. It states  $P(X = 1 \vee Y = 2) = P(X = 1) + P(Y = 2) - P(X = 1 \wedge Y = 2)$ . Explain why this equation holds by drawing a Venn diagram or by considering a finite set.