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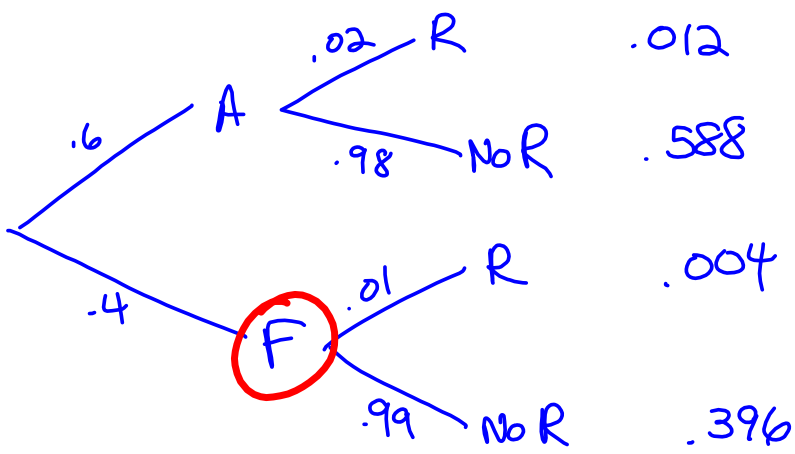
3. In the United States approximately 60% of cars on the road are American made and 40% are foreign made. Of the American cars, 2% are recalled for repairs and of the foreign cards only 1% are recalled. Let A represent American, F represent foreign and R represent recalled.

   a. Create a tree diagram showing what could happen if a car is chosen at random.



   b. Fill in the chart below. The first row is done for you.

Question	In Symbols	Probability—show work.
i. What is the probability a randomly chosen car is a foreign and is recalled?	$P(F \cap R)$	(0.4)(0.01) = 0.004
ii. Prob Amer and Recalled	A $P(F^c \cap R)$	.012
iii. What is the probability that a foreign car is not recalled?	NoR $P(R^c \mid F)$	.99
iv. What is the probability that a randomly chosen car is foreign and not recalled?	P(F ∩ NoR)	.396
v. Prob. Recalled	$P(R)$	.012 + .004 .016
vi. What is the probability that randomly chosen car is not recalled?	P(NoR)	.588 + .396 = .984 or 1 − .016 = .984
vii. What is the probability that a car is a recalled American car or a recalled foreign car?	P(A∩R ∪ F∩R)	.012 + .004 = .016

What Can Go Wrong?

- Don't use a simple probability rule where a general rule is appropriate:
  - Don't assume that two events are independent or disjoint without checking that they are.
- Don't reverse conditioning naively.
- Don't confuse "disjoint" with "independent."
- Don't find probabilities for samples drawn without replacement as if they had been drawn with replacement.

What have we learned?

- The probability rules from Chapter 13 only work in special cases—when events are disjoint or independent.
- We now know the General Addition Rule and General Multiplication Rule.
- We've seen how to use conditional probabilities when sampling without replacement.

What have we learned? (cont.)

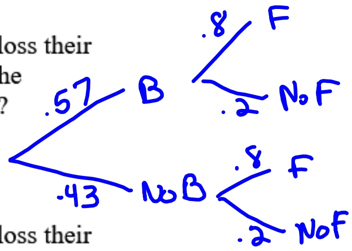
- Venn diagrams, tables, and tree diagrams help organize our thinking about probabilities.
- We now know more about independence—a sound understanding of independence will be important throughout the rest of this course.
- We've seen how to use conditional probability to determine whether two events are independent and to work with events that are not independent.

Multiple Choice Question Bank – Chapter 14

1. In a Stats class, 57% of students eat breakfast in the morning and 80% of students floss their teeth. Forty-six percent of students eat breakfast and also floss their teeth. What is the probability that a student from this class eats breakfast but does not floss their teeth?

   A) 9%   B) 11%   C) 34%   D) 57%

   $.57(.2) = .114$



2. In a Stats class, 57% of students eat breakfast in the morning and 80% of students floss their teeth. Forty-six percent of students eat breakfast and also floss their teeth. What is the probability that a student from this class eats breakfast or flosses their teeth?

   A) 9%   B) 11%   C) 34%   D) 91%

   $\underset{P(B)}{.57} + \underset{P(F|NoB)}{\overset{.344}{.8(.43)}} = .914$

3. Five juniors and four seniors have applied for two open student council positions. School administrators have decided to pick the two new members randomly. What is the probability they are both juniors or both seniors?

   A) 0.395   B) 0.444   C) 0.506   D) 0.569

   $P(2J) \overset{or}{+} P(2S)$

   $\frac{5}{9} \cdot \frac{4}{8} + \frac{4}{9} \cdot \frac{3}{8} = \frac{20}{72} + \frac{12}{72} = \frac{32}{72} = .4$

4. Insurance company records indicate that 12% of all teenage drivers have been ticketed for speeding and 9% for going through a red light. If 4% have been ticketed for both, what is the probability that a teenage driver has been issued a ticket for speeding but not for running a red light?

   A) 3%   B) 8%   C) 13%   D) 17%

5. A poll of 120 city residents found that 30 had visited the new museum, and that 80 had been to the new park. If it appeared that going to the park and going to the museum were independent events, how many of those polled had been to both?

		Museum		
		Yes	No	Total
Park	Yes	x ? ?		80
	No			40
	Total	30	90	120

   $P(M) = P(M|P)$

   $\frac{30}{120} = \frac{x}{80}$

   $x = 20$

   or

   $P(P) = P(P|M)$

   $\frac{80}{120} = \frac{x}{30}$

   $x = 20$

   A) 10   B) 15   C) 20   D) It cannot be determined.

6. Six Republicans and four Democrats have applied for two open positions on a planning committee. Since all the applicants are qualified to serve, the City Council decides to pick the two new members randomly. What is the probability that both come from the same party?

   A) $\frac{66}{90}$ B) $\frac{52}{90}$ C) $\frac{52}{100}$ D) $\frac{42}{90}$

   $P(2R) \overset{or}{+} P(2D)$

   $\frac{6}{10} \times \frac{5}{9} + \frac{4}{10} \cdot \frac{3}{9} = \frac{42}{90}$

X 7. Political analysts estimate the probability that former New York Senator and former Secretary of State Hillary Clinton will run for president in 2016 is 45%, and the probability that New Jersey's Governor Chris Christie will run as the Republican candidate is 20%. If their political decisions are independent, then what is the probability that only Hillary Clinton runs for president?

A) 9% B) 11% C) 36% D) 45%

8. The city council has 6 men and 3 women. If we randomly choose two of them to co-chair a committee, what is the probability these chairpersons are the same gender?

A) 4/9 B) 1/2 C) 5/9 D) 5/8

$P(2m)$ or $P(2w)$

$\frac{6}{9} \times \frac{5}{8} + \frac{3}{9} \times \frac{2}{8} = \frac{36}{72}$

9. A survey of some Stats students recorded gender and whether the student was left or right-handed. Results are summarized in the table shown. If it turned out that handedness was independent of gender, how many of the Stat students were lefty girls?

	Lefty	Righty	Total
Boy			66
Girl	X ?		54
Total	20	100	120

A) 4 B) 9 C) 11 D) It cannot be determined.

$P(L) = P(L|G)$

$\frac{20}{120} = \frac{x}{54}$

$120x = 1080$

$x = 9$

or $P(G) = P(G|L)$

$\frac{54}{120} = \frac{x}{20}$

$x = 9$

10. A bicycle shop equips 60% of their bikes with a water bottle holder. 55% of the bikes they sell have a kickstand attached to the bike. 34% of the bikes sold have both features. What is the probability that a randomly selected bicycle will have a kickstand or a water bottle holder?

A) 34% B) 56.7% C) 61.8% D) 81%

$P(K \text{ or } W) = P(K) + P(W) - P(K \text{ and } W)$

$= .55 + .60 - .34$

$= .81$