Conditional Probability Formula:

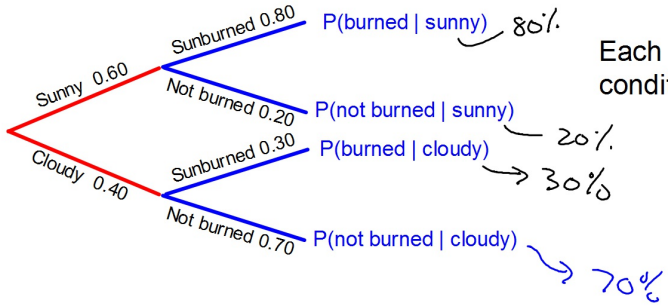
$$P(B \mid A) = \frac{P(A \text{ and } B)}{P(A)}$$

Independent Events: $\frac{P(A) \cdot P(B)}{P(A)}$

Dependent Events: $\frac{P(A) \cdot P(B \text{ after } A)}{P(A)}$

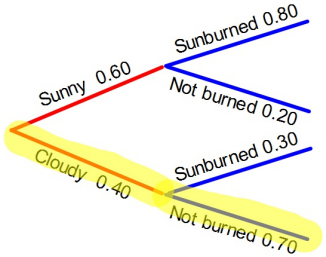
When A and B are independent P(B | A) is really just P(B)

There is an 80% chance I get sunburned when it's sunny and a 30% chance I get sunburned when it's cloudy. It's sunny 60% of the time. This information can be modeled with a tree diagram.



Each blue branch is a conditional probabiliy.

There is an 80% chance I get sunburned when it's sunny and a 30% chance I get sunburned when it's cloudy. It's sunny 60% of the time.

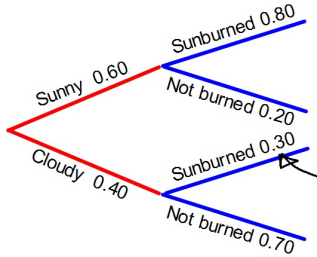


The highlighted branch represents:

P (Not burned and Cloudy) = 28%

(.70)(.40)

There is an 80% chance I get sunburned when it's sunny and a 30% chance I get sunburned when it's cloudy. It's sunny 60% of the time.



Find each probability as a percent to nearest tenth.

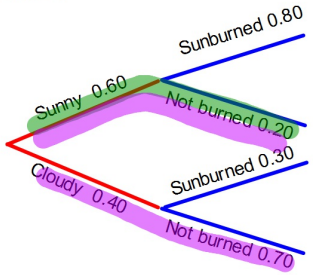
1. P(sunny and I didn't burn) = 12%
   (.60) • (.20)
2. P(burned | cloudy) = 30%
3. P(burned)

P(Burned & sunny or Burned & cloudy)

(.60)(.80) + (.30)(.40)

= 60%

There is an 80% chance I get sunburned when it's sunny and a 30% chance I get sunburned when it's cloudy. It's sunny 60% of the time.



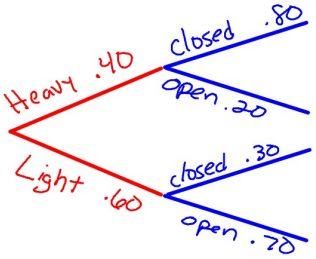
Find P(Sunny | Not burned)

$$P(B \mid A) = \frac{P(A \text{ and } B)}{P(A)}$$

$$= \frac{(.60)(.20)}{(.40)(.70) + (.60)(.20)}$$

$$= 30\%$$

When it snows, 40% of the time it's heavy and 60% of the time it's light. When it's a heavy snowfall school closes 80% of the time. Schools stay open 70% of the time when it's a light snowfall. Model this data with a tree diagram.



Find these probabilities:

1. P(closed | light snow) $= 30\%$
2. P(heavy snow and open) $(.40)(.20) = 8\%$
3. P(schools closed)

$(.40)(.80) + (.60)(.30) = 50\%$

You can now finish Hwk #16

Sec 12-2

Pages 656

Problems 1-8, 11, 12, 25-27

additional compared to the original plan

Simulation:
Examination of a problem often not subject to direct experimentation by means of a simulating device

You are going to take a 5 question True or False Quiz but you didn't study.

What do you think the probability is you will pass if you guess at all 5 questions?

How many questions do you have to get correct in order to pass? 3 or more

Simulating guessing at all five T/F questions:

What could you use to simulate guessing at a True/False question? Flip a coin or roll a die

We'll define an EVEN # as guessing correctly.

- Working in pairs. Your pair will do 30 trials.
- Each trial will consist of rolling 5 dice to simulate guessing at the 5 questions.

Trial #	# EVENS
1	
2	
3	
4	
•	
•	
•	
30	

- For each trial record # of dice that come up EVEN
- When done with all 30 trials find the total # of times you got 3, 4, or 5 EVENS i.e. "passing".

	# times got 3, 4, or 5 EVENS:	# of trials
	13	30
	15	30
	18	30
	17	30
	12	30
	14	30
	16	30
	19	30
	16	30
	11	30
Class totals =	151	300

Experimental P(pass) = $\frac{151}{300}$ = 50.3%