

Example: Temperature X is a conti.

R.V that has pdf $f_X(x) = \begin{cases} 0.5e^{-0.5x} & \text{if } x > 0 \\ 0 & \text{otherwise} \end{cases}$

Q1: What is the prob that

$$P(X > 40 \mid X > 32)?$$

(Given that $X > 32$, what's the conditional prob that $X > 40$)

Q2: What is the prob that

$$P(X > 32 \mid X > 40)?$$

Ans:

Conditional prob is extremely useful. ^{L034}

For example: the auto-fill function
of MS word: (AFF)

Example: By Wiki, "e" 12%

"t" 9%

"a" 8%

So if I have not typed any letter,
the best guess of AFF is

Nonetheless, once I typed the first
letter being "e", is the second letter
also going to be "e"? (double e is
unlikely in English) What is the next
letter should be? Need to use

Ex:

Q: If the AFF likes to pick one word, which
word should we choose?

A:

035) Q2: After typing the first letter being "a",
which letter should AFF choose?

A:

Q3: A detective found that the 2nd letter is "d"
but the first letter is missing. What is
the most likely first letter.

A: Conditioning on the 2nd letter being "d"

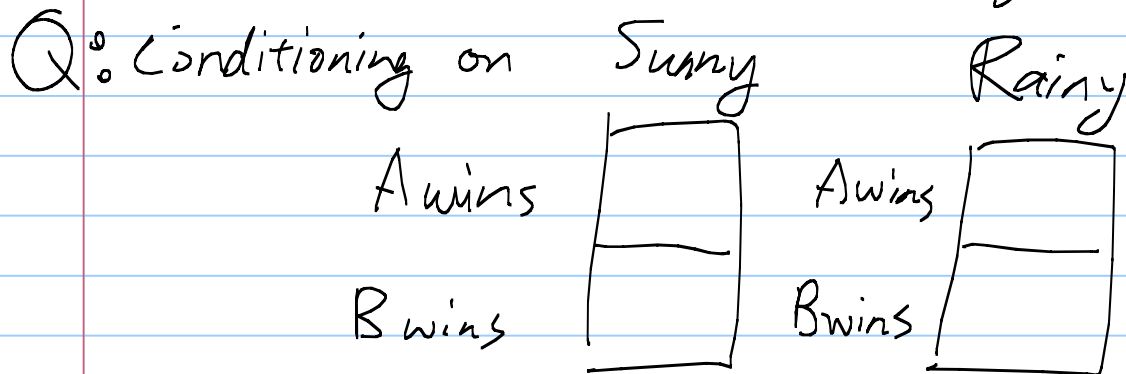
* Another reason why conditional prob is 1036 important is that it can be used to construct W.A.

Continue the two-team, Sunny/Rainy example

	Sunny	Rainy
A wins	$\frac{1}{4}$	$\frac{1}{4}$
B wins	$\frac{1}{6}$	$\frac{1}{3}$

Q: How likely it is a sunny day

Q rainy day?



Q: What if we move to Florida, which has $\frac{9}{10}$ Sunny prob.

$\frac{1}{10}$ Rainy prob

What is a reasonable W.A.?

Ans:

Q: $P(A \text{ wins}) = ?$

In many cases, the statistics of the "conditional prob" is easier to find & can be used to construct new W.A.

Example: Nationally, students who attend lectures have 20% of getting A. Students who do not attend lectures have 10% of getting A. In ECE 302, 80% of students attend lectures. What is the prob that an ECE 302 student gets an A.

Ans:

Many students prefer a tree method rather than the table method to solve the same problem. (see textbook Example 2.25)

Ans

- * Another application of conditional prob.
- * Diagnosing a rare disease