

Bayesian Inference



Problem Set 2 Tip:

Useful Equation to Know

$$P(A \text{ but not } B) = P(A) - P(A \text{ and } B)$$



$$P(A)=0.7$$

Is this enough information to find

$$P(\bar{A})?$$



$$P(A|B)=0.6$$

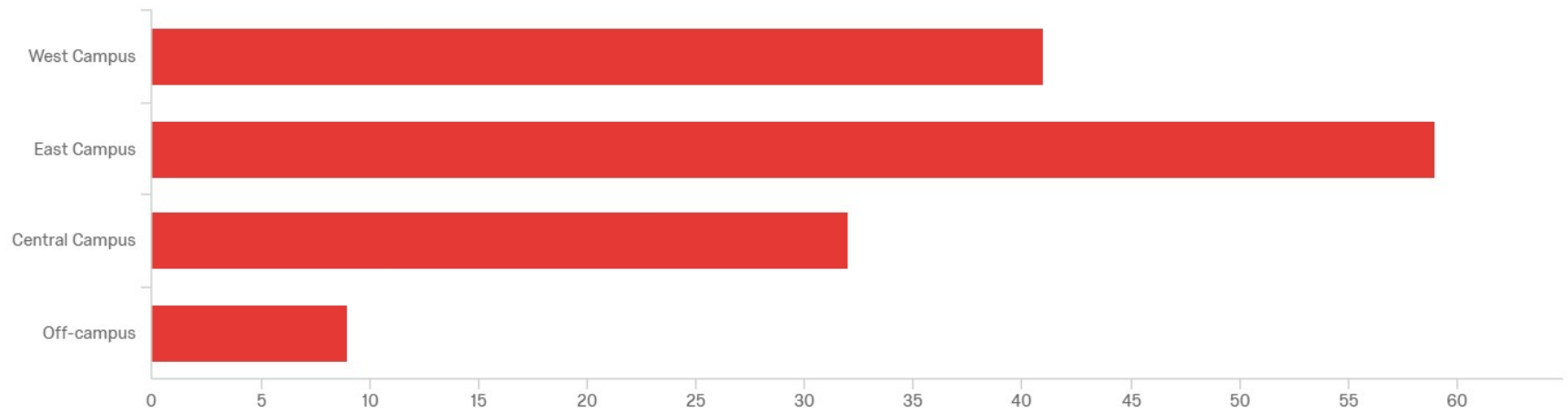
Is this enough information to find

$$P(\bar{A}|B)?$$

Getting to know you!



Where do you live?



$$P(A)=0.7$$

Enough info to find $P(\bar{A})$?

Yes! A and \bar{A} are complementary events, so

$$P(\bar{A})=1-P(A)=1-0.7$$





$$P(A|B)=0.6$$

Enough info to find $P(\bar{A}|B)$?

Yes! $A|B$ and $\bar{A}|B$ are complementary events, so

$$P(\bar{A}|B)=1-P(A|B)=1-0.6$$

**Need help?
Confused about
something?
Come stop by
office hours!**



Office Hours

Instructor Office Hours: Tuesdays 2:00pm-4:00pm Old Chemistry 208A

TA Office Hours:

TA	Time	Location
Sibora Seranaj	Monday 9 - 11 am	Old Chem 203B
Austin Jia	Monday 2 - 4pm	Old Chem 203B
Valerie Roberts	Monday 6:30 - 8:30pm	Old Chem 025
Morgan Bird	Monday, 5:00 - 7:00pm	Old Chem 025
Melanie Lai Wai	Tuesday 8:30 - 10:30am	Old Chem 203B
Ed Tam	Tuesday 12pm - 2pm	Old Chem 203B
Samantha Morales	Tuesday 3:30-5:30pm	Old Chem 203B
Brian Jiang	Tuesday 6:00-8:00pm	Old Chem 203B
Rose Graves	Tuesday 7-9pm	Old Chem 203B
Junette Yu	Wednesday 11:00-1:00pm	Old Chem 203B
Eduardo Coronado	Wednesday 5 - 7pm	Old Chem 025
Tess Chandler	Thursday 3-4pm	Old Chem 203B
Mark Sampson	Thursday 6:00-8:00 pm	Old Chem 025
Vanessa Alwan	Friday 8-10am	Old Chem 203B
Tess Chandler	Friday 12-1pm	Old Chem 025
Lavonne Hoang	Friday 2-4 pm	Old Chem 203B
Tessa Johnson	Friday 5:30-7:30 pm	Old Chem 025

<https://www2.stat.duke.edu/courses/Spring19/sta101.001/officehours.html>

$P(A \text{ and } B)=0.6$ and $P(A \text{ and } \bar{B})=0.2$

Is this enough information to find

$P(A)$?



Need help? Confused about something? Ask on Sakai!

The screenshot displays the Piazza Q&A interface for a course (STA. 101.001.SP19). The left sidebar contains navigation options: Overview, Announcements, Syllabus, Calendar, Email, Drop Box, Resources, Assignments, Gradebook, Statistics, Site Info, Tests & Quizzes, Piazza, and Help. The main content area shows a 'New Post' form with the following options:

- Post Type:** Question (if you need an answer), **Note** (if you don't need an answer), Poll/In-Class Response (if you need a vote).
- Post to:** Entire Class (selected), Individual Student(s) / Instructor(s).
- Select Folder(s):** hw1, hw2, hw3, hw4, hw5, hw6, hw7, hw8, hw9, hw10, project, exam, logistics, other.
- Summary:** Flipped Class Tip (100 characters or less).
- Details:** use plain text editor.

The post content area contains a rich text editor with a toolbar (Edit, Insert, View, Format, Table) and a text area with the following text:

Why do you need to look on both sides of a randomization distribution if the alternative hypothesis has “≠” ?

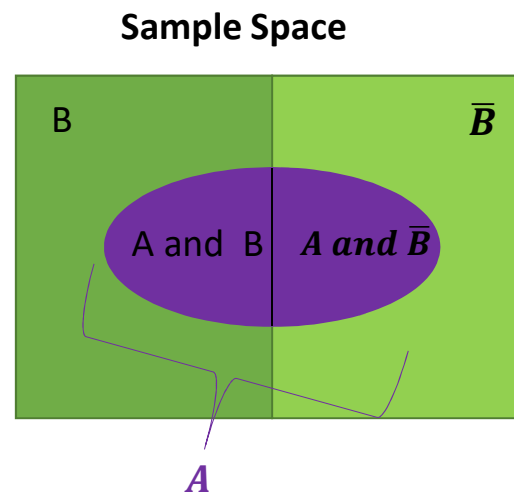
The right sidebar shows a list of posts under 'DRAFTS' and 'PINNED' sections. The 'PINNED' section includes:

- Private Search for Teammates! 1/7/19
- Private Introduce Piazza to your stu... 5:52PM
- Private Get familiar with Piazza 5:52PM
- Private Tips & Tricks for a success... 5:52PM
- Welcome to Piazza! 5:52PM

$P(A \text{ and } B)=0.6$ and $P(A \text{ and } \bar{B})=0.2$

Enough info to find $P(A)$?

Yes! $P(A)=P(A \text{ and } B)+P(A \text{ and } \bar{B})=0.6+0.2$



$P(A|B)=0.6$, $P(A|\bar{B})=0.5$, and $P(B)=0.3$

Is this enough information to find

$P(B|A)$?

Win candy today!



$P(A|B)=0.6$, $P(A|\bar{B})=0.5$, and $P(B)=0.3$

Is this enough information to find

$P(B|A)$?

Yes! We have enough information to fill out a Bayesian Probability Tree to get the answer!

