Stats 300 **Spring 2024**

Conditional probability using counts instead of probabilities
College students

Undergraduates at a 4-year university are classified by year (1st-year, 2nd, 3rd, 4th) and living status (on-campus and off-campus). See the table.

	1st-year	2nd-year	3rd-year	4th-year
On-campus	4253	2861	1727	585
Off-campus	934	1829	2487	3918

1) How many students live on campus? Off campus?

2) How many students are 1st-year? Second year? Third? Fourth?

3) How many undergraduates attend the school?

4) If a student is chosen at random, what is the probability that he/she is 2nd year?

5) If a student is chosen at random, what is the probability that he/she lives off campus?

6) If a student who lives off campus is chosen at random, what is the probability that he/she is 2nd year? What is the probability that he/she is not 2nd year?

7) If a 2nd-year student is chosen at random, what is the probability that he/she lives off campus? What is the probability that he/she lives on campus?

Conditional probability: **Dogs and Fleas**

A: The household has dogs (at least one dog).
B: The household has fleas.

* Assume 60% of households have dogs. Thus, 40% do not.
P(A) = 0.6, P(not A) = 0.4

* Of households with dogs, 70% have fleas, and 30% do not.
(Translation: The probability that a household has fleas, given that it has dogs, is 70%.)
P(B|A) = 0.7, P(not B | A) = 0.3

* Of households without dogs, 25% have fleas, and 75% do not.
(The probability that a household has fleas, given that it has no dogs, is 25%.)
P(B | not A) = 0.25, P(not B | not A) = 0.75

Q1: What percent of households have fleas?
P(B) =

Q1A: What percent of households do not have fleas?
P(not B) =

Q2: Given that a household has fleas, what is the probability that it has dogs?
P(A|B) =

Q2A: Given that a household has fleas, what is the probability that it has no dogs?
P(not A | B) =

Q3: Given that a household does not have fleas, what is the probability that it has dogs?
P(A | not B)

Q3A: Given that a HH does not have fleas, what is the probability that it has no dogs?
P(not A | not B)