

Conditional Probability

STAT-UB.0103 – Statistics for Business Control and Regression Models

Counting (Review)

1. There are 10 people in a club. How many ways are there to choose the following:
 - (a) A president, vice president, and treasurer?
 - (b) A 3-person committee.

Conditional Probability

2. Here is a table tabulated frequencies for the majors and genders of the students in the class survey.

Major	Gender		Total
	Female	Male	
Finance	12	20	32
Other	4	3	7
Undecided	10	15	25
Total	26	38	64

- (a) List 2 interesting conclusions you can draw from the data in the table. At least one of your conclusions should compare Females and Males. All of your conclusions should involve proportions or probabilities.

Example: $\frac{32}{64} = 50\%$ of students listed Finance as their major.

- (b) Which of the conclusions you listed are conditional probabilities?

3. The following table shows the number of pairs of shoes reported and the genders of the 63 survey respondents who answered the questions “How many pairs of shoes do you own?”.

Gender	Pairs of Shoes					Total
	1–3	4–6	7–9	10–12	>12	
Female	0	1	4	9	11	25
Male	3	13	11	7	4	38
Total	3	14	15	16	15	63

Use this data to answer the following questions.

- (a) If we pick a random survey respondent out of these 63, and it turns out that the respondent happens to be Female, what is the chance that the respondent will have 10–12 pairs of shoes.
- (b) Answer the previous problem using the equation $P(B | A) = \frac{P(A \cap B)}{P(A)}$. Here, the events are as follow:

A = respondent is female,

B = respondent owns 10–12 pairs of shoes.

- (c) If we pick a respondent who owns 4–6 pairs of shoes, what is the chance that the respondent is male?
- (d) Find the conditional probability $P(>12 \text{ pairs of shoes} | \text{Female})$.
- (e) Find the conditional probability $P(\text{Female} | >12 \text{ pairs of shoes})$.
- (f) Explain, the difference between (d) and (e).

The Multiplicative Rule

4. Out of the 70 students enrolled in the class, 25 are female (36%) and 45 are male (64%). Suppose that we randomly select two different students.

(a) What is the probability that both students are male?

(b) What is the probability that both students are female?

(c) What is the probability that one of the students is male and one of the students is female?

5. Of the 64 students who filled out the survey, 13 indicated that they are currently employed, either at an internship or a paid position ($13/64 = 20\%$). Suppose that we randomly select two different survey respondents.

(a) What is the probability that both students are currently working?

(b) What is the probability that neither student is currently working?

(c) What is the probability that exactly one student is currently working?