

10.2 NOTES

4/9/19

Two-Way Tables

Warm Up

A bag contains 4 red, 8 blue, and 2 yellow marbles. Find each probability.

$$\text{prob} = \frac{\# \text{ of desired outcomes}}{\# \text{ of possible outcomes}}$$

1. $P(\text{red}) = \frac{4}{14} \approx 29\%$ 2. $P(\text{blue}) = \frac{8}{14} \approx 57\%$

3. $P(\text{red or yellow}) = \frac{6}{14} \approx 43\%$ 4. $P(\text{not red}) = \frac{10}{14} \approx 71\%$

Two-Way Tables

Suppose you asked 20 children and adults whether they liked broccoli. The two-way table displays the data.

The **joint relative frequencies** are the values in each category divided by the total number of values.

	Yes	No	Total
Child	3	8	11
Adult	7	2	9
	10	10	20

Directions: Rewrite the table showing the joint relative frequencies.

	Yes	No
C	0.15	0.40
A	0.35	0.10

Two-Way Tables

The **marginal relative frequencies** are found by adding the joint relative frequencies in each row and column.

joint relative frequencies

	Child	Adult
Yes	0.15	0.4
No	0.35	0.1
Total	0.5	0.5

marginal relative frequencies

	Teen	Adult	total
0	0.12	0.424	0.544
1	0.032	0.256	0.288
2+	0.072	0.096	0.168
	0.224	0.776	1

Two-Way Tables

To find a **conditional relative frequency**, divide the joint relative frequency by the marginal relative frequency. Conditional relative frequencies can be used to find conditional probabilities.

$$\frac{8}{11} \approx 73\%$$

Ex: If you are given that the respondent is a child, what is the probability that they didn't like broccoli?

$$\text{Cond.} = \frac{\text{joint}}{\text{marginal}}$$

Two-Way Tables

Example 1:

The table shows the results of randomly selected car insurance quotes for 125 cars made by an insurance company in one week. Make a table of the joint and marginal relative frequencies.

	Teen	Adult	
0 accidents	15	53	68
1 accident	4	32	36
2+ accidents	9	12	21
	28	97	125

Two-Way Tables

Example 1: Answer

	Teen	Adult
0 accidents	15	53
1 accident	4	32
2+ accidents	9	12

	Teen	Adult	Total
0 acc.	0.12	0.424	0.544
1 acc.	0.032	0.256	0.288
2+ acc.	0.072	0.096	0.168
Total	0.224	0.776	1

Ex: say yes to arena and no to the library?

$$\frac{30}{150} \approx 0.20$$

20%

Two-Way Tables

Example 2: Using Conditional Relative Frequency to Find Probability

A reporter asked 150 voters if they plan to vote in favor of a new library and a new arena.

		Library	
		Yes	No
Arena	Yes	21	30
	No	57	42

$$\frac{21}{150} \approx 0.14$$

a. What is the probability that a voter will say yes to both the arena and the library?

14%

Two-Way Tables

Example 2: Using Conditional Relative Frequency to Find Probability

A reporter asked 150 voters if they plan to vote in favor of a new library and a new arena.

		Library	
		Yes	No
Arena	Yes	21	30
	No	57	42

$$\frac{21}{78} \approx 0.27$$

b. Given that a person says yes to a library, what is the probability that this person will also say yes to the arena?

27%

Ex: (3) What's the prob. that a Sprite can was found in the garbage?

$$\frac{8}{72} \approx 11\%$$

Ex: (4) Given that the can was Sprite, what is the prob. that it was in garbage? $\frac{8}{22} \approx 36\%$

	CC	Sprite	
Tab	0.222	0.194	0.417
Gar	0.472	0.111	0.583
Tot	0.694	0.305	1.000

Two-Way Tables

You go to a dance and help clean up afterwards. To help, you collect the soda cans, Coca-Cola and Sprite, and organize them. Some cans were on the table and some were in the garbage. Seventy-two total cans were found. 42 total cans were found in the garbage and fifty total cans were Coca-Cola. 14 Sprite cans were found on the table. Create a two-way table.

	Coca-Cola	Sprite	Total
Table	16	14	30
Garbage	34	8	42
Total	50	22	72

Ex: (1) Given that a can was found on the table, what is the probability that it was Sprite?

$$\frac{14}{30} \approx 47\%$$

Ex: (2) What's the prob. that a coke can was found in the garbage?

$$\frac{34}{72} \approx 47\%$$