Name _____   Date_____

Association Between Categorical Variables

A random sample of 100 eighth-grade students is asked to record two variables, whether they have a television in their bedroom and if they passed or failed their last math test. The results of the survey are summarized below.

- 55 students have a television in their bedroom.

- 35 students do not have a television in their bedroom and passed their last math test.

- 25 students have a television and failed their last math test.

- 35 students failed their last math test.

1. Complete the two-way table.

	Pass	Fail	Total
Television in Bedroom			
No Television in Bedroom			
Total			

2. Calculate the row relative frequencies and enter the values in the table above. Round to the nearest thousandth.

3. Is there evidence of association between the variables? If so, does this imply there is a cause-and-effect relationship? Explain.

A sample of 200 middle school students was randomly selected from the middle schools in a large city. Answers to several survey questions were recorded for each student. The tables below summarize the results of the survey.

For each table, calculate the row relative frequencies for the female row and for the male row. Write the row relative frequencies beside the corresponding frequencies in each table below.

1. This table summarizes the results of the survey data for the two variables, gender and which sport the students prefer to play. Is there an association between gender and which sport the students prefer to play? Explain.

		Sport				
		Football	Basketball	Volleyball	Soccer	Total
Gender	Female	2	29	28	38	97
	Male	35	26	8	24	103
	Total	37	65	36	62	200

2. This table summarizes the results of the survey data for the two variables, gender and the students' T-shirt sizes. Is there an association between gender and T-shirt size? Explain.

		School T-Shirt Sizes				
		Small	Medium	Large	X-Large	Total
Gender	Female	47	35	13	2	97
	Male	11	41	42	9	103
	Total	58	76	55	11	200

3. This table summarizes the results of the survey data for the two variables, gender and favorite type of music. Is there an association between gender and favorite type of music? Explain

		Favorite Type of Music				
		Pop	Hip Hop	Alternative	Country	Total
Gender	Female	35	28	11	23	97
	Male	37	30	13	23	103
	Total	72	58	24	46	200

A random sample of 100 eighth grade students is asked to record two variables, whether they have a television in their bedroom and if they passed or failed their last math test. The results of the survey are summarized below.

- 55 students have a television in their bedroom.
- 35 students do not have a television in their bedroom and passed their last math test.
- 25 students have a television and failed their last math test.
- 35 students failed their last math test.

1. Complete the two-way table.

	Pass	Fail	Total
Television in Bedroom	30 ≈ 0.545	25 ≈ 0.455	55 1.000
No Television in Bedroom	35 ≈ 0.778	10 ≈ 0.222	45 1.000
Total	65 ≈ 0.650	35 ≈ 0.350	100 1.000

2. Calculate the row relative frequencies and enter the values in the table above. Round to the nearest thousandth.

   Row relative frequencies are displayed in the table above.

3. Is there evidence of association between the variables? If so, does this imply there is a cause-and-effect relationship? Explain.

   Yes, there is evidence of association between the variables because the relative frequencies are different among the rows. However, this does not necessarily imply a cause-and-effect relationship. The fact that a student has a television in their room does not cause the student to fail a test. Rather, it may be that the student is spending more time watching television or playing video games instead of studying.

A sample of 200 middle school students was randomly selected from the middle schools in a large city. Answers to several survey questions were recorded for each student. The tables below summarize the results of the survey.

For each table, calculate the row relative frequencies for the female row and for the male row. Write the row relative frequencies beside the corresponding frequencies in each table below.

1. This table summarizes the results of the survey data for the two variables, gender and which sport the students prefer to play. Is there an association between gender and which sport the students prefer to play? Explain.

		Sport				
		Football	Basketball	Volleyball	Soccer	Total
Gender	Female	2 ≈ 0.021	29 ≈ 0.299	28 ≈ 0.289	38 ≈ 0.392	97
	Male	35 ≈ 0.340	36 ≈ 0.350	8 ≈ 0.078	24 ≈ 0.233	103
	Total	37	65	36	62	200

Yes, there appears to be an association between gender and sports preference. The row relative frequencies are not the same for the male and the female rows, as shown in the table above.

2. This table summarizes the results of the survey data for the two variables, gender and the students' T-shirt sizes. Is there an association between gender and T-shirt size? Explain.

		School T-Shirt Sizes				
		Small	Medium	Large	X-Large	Total
Gender	Female	47 ≈ 0.484	35 ≈ 0.361	13 ≈ 0.134	2 ≈ 0.021	97
	Male	11 ≈ 0.107	41 ≈ 0.398	42 ≈ 0.408	9 ≈ 0.087	103
	Total	58	76	55	11	200

Yes, there appears to be an association between gender and T-shirt size. The row relative frequencies are not the same for the male and the female rows, as shown in the table above.

3. This table summarizes the results of the survey data for the two variables, gender and favorite type of music. Is there an association between gender and favorite type of music? Explain.

		Favorite Type of Music				
		Pop	Hip Hop	Alternative	Country	Total
Gender	Female	35 ≈ 0.361	28 ≈ 0.289	11 ≈ 0.113	23 ≈ 0.237	97
	Male	37 ≈ 0.359	30 ≈ 0.291	13 ≈ 0.126	23 ≈ 0.223	103
	Total	72	58	24	46	200

No, there may not be an association between gender and favorite type of music. The row relative frequencies are about the same for the male and female rows, as shown in the table above.