FST 6-5 Notes
Topic: Contingency Tables
GOAL
This lesson shows how to compute relative frequencies and probabilities from contingency tables.

SPUR Objectives

H Use a contingency table to compute percentages involving categorical variables.

M Represent information about relative frequencies or frequencies in a contingency table.

Vocabulary

contingency tables

Simpson's Paradox

Contingency tables – are tables that divide outcomes among two or more categorical variables.

Warm-up
Willie Fielder hurt himself two games in the 2047 baseball season and only batted 6 times with 1 hit, for a batting average of 0.167. Scott ("Scruffy") Scrub played the entire season but was a second-stringer, so was up only 100 times ang got 19 hits, for a batting average of 0.190, better that Willie's average. In the 2048 season, Willie was well and got 201 hits in 600 at-bats. Scott still remained a second-stringer and was up only 100 times again, but got 35 hits.

a. What was Willie's batting average for the 2048 season?

batting Avg = $\frac{\text{hits}}{\text{At bats}}$ $\quad 201/600 = .335$

b. What was Scott's batting average for the 2048 season?

$35/100 = .35$

c. What was Willie's combined batting average for the 2047 and 2048 seasons?

$\frac{1+201}{6+600} = \frac{202}{606} = .333$

d. What was Scott's combined batting average for the 2047 and 2048 seasons?

$\frac{19+35}{100+100} = \frac{54}{200}$

$= .27$

	2047		2048	
Player	At bats	Hits	At bats	Hits
Fielder	6	1	600	201
Scrub	100	19	100	35

Titanic Table 1 below lists the number of passengers and crew who survived and died (the possible outcomes) in the sinking of the Titanic, categorized by status (first-class, second-class, third-class, and crew).

Titanic Table 1: Status and Survival

	First	Second	Third	Crew	Total
Survived	203	118	178	212	711
Died	122	167	528	673	1490
Total	325	285	706	885	2201

Source: British Wreck Commissioner's Inquiry Report

Example 1: Use the table above.

a. Out of all the people on the ship, what percent died?

$\frac{1490}{2201} = 67.7\%$

b. What percent of passengers in third class died?

$\frac{528}{706} = 74.8\%$

c. What percent of passengers in first or second class died?

$\frac{122+167}{325+285} = \frac{289}{610} = 47.4\%$

Example 2:

A 2001 study by the University of Texas Southwestern Medical Center examined 626 patients to see if there was a connection between getting a tattoo and infection with Hepatitis C (HCV). The results are in the contingency table below.

	Tattoo Done in Commercial Tattoo Parlor	Tattoo Done Elsewhere	No Tattoo	Total
Has Hepatitis C	17	8	18	43
No Hepatitis C	35	53	495	583
Total	52	61	513	626

Source: Haley RW, Fischer RP In Medicine, March 2001

a. What percent of people in the study did not have a tattoo?

$513/626 = 81.9\%$

b. What percent of people in the study with no tattoo had Hepatitis C?

$18/513 = 3.5\%$

c. What percent of people in the study with a tattoo had Hepatitis C?

$\frac{17+8}{52+61}$ $25/113 = 22.1\%$

d. What can you conclude from answers to Parts b and c?

$\frac{22.1}{3.5} = 6.3$

People with tattoos were 6.3 times more likely to get Hep C

Example 3:

Fifth-grade students in a school were surveyed about their favorite book series. The results are reported in the contingency table below.

	Harry Potter	Animorphs	Lemony Snicket	Lord of the Rings	Other
Boys	42%	15%	23%	11%	9%
Girls	51%	8%	28%	5%	8%

Suppose the 5th-grade class contains 117 girls and 125 boys. Did more boys than girls prefer Lemony Snicket?

boys = .23(125) = 28.75 = 29

girls = .28(117) = 32.76 = 33

No girls preferred the book more than the boys