Skills Practice: Conditional Probability using Two-Way Frequency Tables

Directions: For all questions, round answers to the hundredths place.

1. In a survey of 650 people, 300 are female and 275 prefer chocolate ice cream. Of those preferring chocolate ice cream, 102 are male. Use this information to fill in the table below.

	Males	Females	Total
Vanilla	248	127	375
Chocolate	102	173	275
Total	350	300	650

If a person is selected at random, find the **probability** that:

a. The person prefers chocolate ice cream $P(C) = \frac{275}{650} = .42$

b. The person is male and prefers vanilla ice cream $P(m \cap V) = \frac{248}{650} = .38$

c. The person is female or prefers vanilla ice cream $P(F \cup V) = \frac{300 + 375 - 127}{650} = \frac{548}{650} = .84$

d. The person likes vanilla, **given** they are male $P(V \mid M) \rightarrow \frac{248}{350} = .71$

e. P(Female | Chocolate) $\rightarrow \frac{173}{275} = .63$

2. On April 15, 1912, the Titanic struck an iceberg and rapidly sank with only 500 of her 1,317 passengers and crew surviving. Data on survival of passengers are summarized in the table below. (Data source: http://www.encyclopedia-titanica.org/titanic-statistics.html)

	Survived	Did not survive	Total
First class passengers	201	123	324
Second class passengers	118	166	284
Third class passengers	181	528	709
Total passengers	500	817	1317

Calculate the following probabilities:

a. What is the probability that the passenger survived, **given** that this passenger was in first class?

$P(Sur \mid FC) \rightarrow \frac{201}{324} = .62$

b. What is the probability that the passenger was in third class, **given** that the passenger did not survive?

$P(TC \mid Sur') \rightarrow \frac{528}{817} = .65$

3. The following two-way frequency table shows a count of popular drinks at dinner based on gender.

Popular drinks at dinner

Drinks	Boys	Girls	
Milk	16	18	34
Juice	12	7	19
Water	9	10	19
	37	35	72

a. What is the probability that a randomly selected person prefers water?

$P(W) = 19/72 = .26$

b. What is the probability that a person prefers milk, if the person is male?

$P(M \mid \text{Male}) = \frac{16}{37} = .43$

c. What is the probability that a person is female, if the person prefers juice?

$P(F \mid J) = \frac{7}{19} = .37$

4. Use the table above to answer the following questions:

Favorite Subject by Grade					
Grade	**English**	**History**	**Math/Science**	**Other**	**Totals**
7th Grade	38	36	28	14	116
8th Grade	47	45	72	18	182
Totals	85	81	100	32	298

a. What is the probability that a randomly selected person prefers math/science?

$P(M/S) = 100/298 = .34$

b. What is the probability that a randomly selected person will prefer history, given that the person is an 8th grader?

$P(H \mid 8^{th}) = \frac{45}{182} = .25$

c. What is the probability that a randomly selected person will be a 7th grader, given that the person prefers English?

$P(7^{th} \mid E) = \frac{38}{85} = .45$