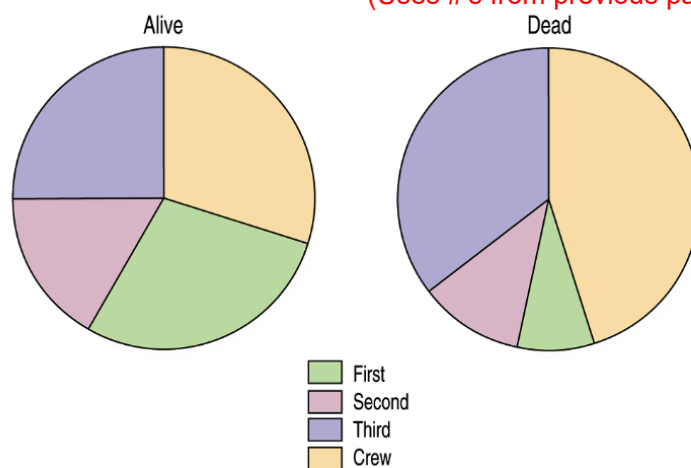# Conditional Distributions (cont.) Pg. 27

- The conditional distributions tell us that there is a difference in class for those who survived and those who perished.

(Uses #'s from previous page)

- This is better shown with pie charts of the two distributions:

Conditional Distributions (cont.)

- We see that the distribution of *Class* for the survivors is different from that of the non-survivors.
- This leads us to believe that *Class* and *Survival* are associated, that they are <u>not independent.</u>
- The variables would be considered independent when the distribution of one variable in a contingency table is the same for all categories of the other variable.

Associations vs. Independence

↳ Not Independent

If the distribution of one variable is almost the same for all categories of another, we say that the variables are **independent**.

This would mean the Class the person was in did not affect whether the person lived or died. This was NOT the case in the Titanic example, so the events are **NOT INDEPENDENT**.

We say the events are **ASSOCIATED**.

Example of Association vs Independence

A random survey was taken as people left the grocery store. People from ages 5-80 were asked which of these fruit is their favorite: apples, oranges, berries, melons, other. Their ages and preference were recorded into the following table.

Age	Apple	Orange	Berries	Melons	Other	Total
5 - 10	15	6	4	7	2	34
11 - 20	15	28	8	8	5	64
21 - 30	23	25	40	12	8	108
31 - 50	15	17	18	12	9	71
51 - 80	10	12	18	20	8	68
Total	78	88	88	59	32	345

Conditional Distibution of Fruit by Age						
Age	Apple	Orange	Berries	Melons	Other	Total
5 - 10	44.1%	17.6%	11.8%	20.6%	5.9%	100%
11 - 20	23.4%	43.8%	12.5%	12.5%	7.8%	100%
21 - 30	21.3%	23.1%	37.0%	11.1%	7.4%	100%
31 - 50	21.1%	23.9%	25.4%	16.9%	12.7%	100%
51 - 80	14.7%	17.6%	26.5%	29.4%	11.8%	100%

15/34 X 100 = 44.1%

In this example, are age and fruit preference independent or associated?

Associated

Why?

Because the conditional distributions are different for the different age groups. For example, the young kids have a high proportion who prefer apples (44.1%) as compared to the other age groups that have not chosen apples as their favorite. This shows us that age of a person has an affect on their choice of preferred fruit, so age and fruit choice are not independent and are associated.

Using the same example from before, what if the conditional distributions looked more like this:

Conditional Distribution of Fruit by Age						
Age	Apple	Orange	Berries	Melons	Other	Total
5 - 10	23.0%	38.0%	18.0%	8.0%	13.0%	100%
11 - 20	21.0%	39.0%	19.0%	6.0%	15.0%	100%
21 - 30	22.0%	38.0%	20.0%	9.0%	11.0%	100%
31 - 50	25.0%	36.0%	19.0%	8.0%	12.0%	100%
51 - 80	24.0%	39.0%	18.0%	6.0%	12.7%	100%

In this example, are age and fruit preference independent or associated?

Indepenent

Why?

Because the conditional distributions are very similar for the different age groups. For example, all of the age groups tend to choose oranges as their favorite and melons as their least favorite. This shows us that age of a person has no affect on their choice of preferred fruit, so age and fruit choice are independent.

Homework:

Read pg. 26-34

Pg. 31-38 #1, 19 *(End of chapter Questions*

Finish Reading Guide (Skip #8) *pg. 13-14 in Packet*

In Your World Worksheet *Pg 30 in packet*
(Relates pg. 32 in text)