

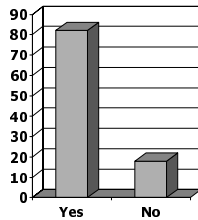
# STAT 200

## Group Exercise 3

Should the U.S. Air Force shoot down hijacked airliners that threaten cities?

Should the U.S. Air Force shoot down hijacked airliners that threaten cities?

- Yes 82% 213,721
- No 18% 46,586
- Total: 260,307 votes



## GROUP EXERCISE

- Work together and share information
- Make sure everyone is involved and has a chance to
  - Contribute
  - Learn
- Seek me out if the group needs help
- Let me know if there are problems

## THE GROUPS

### ROUP 1

Achuff, Sally  
Early, Kristen  
Herzka, Aaron  
Lagonigro, Raffaele  
Silverman, Jared  
Zitowsky, Lauren

### ROUP 4

Cordrey, Cara  
Fredricks, Katie  
Johnson, Heidi  
Morvey, Stacie  
Weber, Stephanie

### ROUP 7

Dacker, William  
Hatt, Aliza  
Krisch, Jennifer  
Setting, Samantha  
Wu, Xiaowo

### ROUP 2

Bennett, Kathryn  
Eckstrand, Christina  
Hornberg, Claudia  
McCarti, Laura  
Taylor, Jennifer

### ROUP 5

Dalton, Rebecca  
Garwood, Allison  
Kauffman, Eric  
Pitts, Justin  
Weiss, Caryn

### ROUP 6

Davis, Allyson  
Cass, Stephanie  
Kostich, Lori Ann  
Sawyer, Thomas  
Wise, Thomas

### ROUP 3

Buccos, Jill  
Faul, Katherine  
Jenson, Kathleen  
More, Christine  
Tigani, Nicole

## Table Problem

Downloading copyrighted music without paying for it is the same as stealing

	Agree	Disagree	Row Total
Downloader	27	71	98
Non-Downloader	568	334	902
Column Total	595	405	1000

Let Event A = Downloader and Event B = Disagree

$$P(A) = 98/1000 = .098 \text{ or } 9.8\% \text{ of sample downloaded files}$$

$$P(B^c) = 595/1000 = .595 \text{ or } 59.5\% \text{ of sample agreed}$$

$$P(A \cap B) = 71/1000 = .071 \text{ or } 7.1\% \text{ were both downloaders and disagreed}$$

## Table Problem

Downloading copyrighted music without paying for it is the same as stealing

	Agree	Disagree	Row Total
Downloader	27	71	98
Non-Downloader	568	334	902
Column Total	595	405	1000

Let Event A = Downloader and Event B = Disagree

$P(B|A) = 71/98 = .724$  or 72.4% of downloaders disagreed

$P(B|A^c) = 334/902 = .370$  or 37.0% of nondownloaders disagreed

## Table Problem - Odds

Downloading copyrighted music without paying for it is the same as stealing

	Agree	Disagree	Row Total
Downloader	27	71	98
Non-Downloader	568	334	902
Column Total	595	405	1000

Odds that Downloaders Disagree =  $71/27 = 2.63$   
Downloaders were 2.6 times as likely to disagree as to agree

Odds that NonDownloaders Disagree =  $334/568 = .588$   
NonDownloaders were .59 times as likely to disagree as to agree

## Table Problem – Odds Ratio

Downloading copyrighted music without paying for it is the same as stealing

	Agree	Disagree	Row Total
Downloader	27	71	98
Non-Downloader	568	334	902
Column Total	595	405	1000

Odds Ratio of Downloaders to Non-Downloaders for disagreeing vs agreeing

$$2.63 / .588 = 4.472$$

Downloaders were 4.5 times as likely to disagree than were nondownloaders

## Problem 2

- I have two pairs of socks, and they look nearly identical - one navy blue and the other black. My wife matches the socks incorrectly much more than she does correctly. If all four socks are in front of her, it seems to me that her chances are 50% for a wrong match and 50% for a correct match. What do you think?

## Problem 2

- One approach to the problem
- Let
  - NB stand for Navy Blue sock
  - B stand for Black sock
  - r and l stand for right sock and left sock
- The probability for the first pick at random = .25
- The probability of the second pick at random = .333

The probability of a right pick is  $4(.0833) = .3333$

FIRST PICK	SECOND PICK	P
NB	NBr	.0833
	Br	.0833
	Bl	.0833
NB	NBl	.0833
	Br	.0833
	Bl	.0833
B	NBr	.0833
	NBl	.0833
	Br	.0833
B	NBr	.0833
	NBl	.0833
	Bl	.0833

### Problem 3

- A fast food restaurant has determined that the chance a customer will order a soft drink is .90. The chance that a customer will order a hamburger is .6, and the chance for ordering french fries is .5.
- Let S = event of buying a soft drink
- Let H = event of buying a hamburger
- Let F = event of buying French fries

### Problem 3

- If a customer places an order, what is the probability that the order will include a soft drink and no fries *if these two events are independent?*
  - If they are independent,  $P(S \cap F^c) =$
  - $P(S) \cdot P(F^c) =$
  - $.9 \times .5 = .45$

### Problem 3

- The restaurant has also determined that if a customer orders a hamburger the chance the customer will also order fries is .8. Determine the probability that the order will include a hamburger and fries.
  - The problem states that the  $P(F|H) = .8$
  - So,  $P(H \cap F) = P(H) \cdot P(F|H) =$
  - $.6 \times .8 = .48$

### Problem 4

- A soap company has two production facilities, one in Ohio and one in Virginia. They make the same type of soap at each facility. The Ohio facility makes 60% of the soap and the Virginia plants makes 40%. All the soap is shipped to a central warehouse and is intermingled. When the company sells a defective product, it must incur the cost of replacing the item and the loss of customer goodwill. After extensive testing, the quality control department reports that 5% of the soap produced in Ohio and 10% of the soap in Virginia is unusable.

### Problem 4

- The Vice-President of Production wants to allocate the costs of the defects to each plant in a fair manner. To do so she wants to find:
  1. The probability that the soap was produced in Ohio, given that the soap was defective
  2. The probability that the soap was produced in Virginia, given that the soap was defective

### Problem 4: Build a Table and fill in values

Reality	Good	Defective	Total
Ohio			
Virginia			
Total			1,000

**Problem 4: Build a Table and fill in values**

Reality	Good	Defective	Total
<b>Ohio</b>			<b>600</b>
<b>Virginia</b>			<b>400</b>
<b>Total</b>			<b>1,000</b>

**Problem 4: Build a Table and fill in values**

Reality	Good	Defective	Total
<b>Ohio</b>	<b>570</b>	<b>30</b>	<b>600</b>
<b>Virginia</b>	<b>360</b>	<b>40</b>	<b>400</b>
<b>Total</b>	<b>930</b>	<b>70</b>	<b>1,000</b>

**Problem 4**

- The probability that the soap was produced in Ohio, given that the soap was defective
  - $30/70 = .429$
- The probability that the soap was produced in Virginia, given that the soap was defective
  - $40/70 = .571$

**Problem 4 - Odds**

- **Odds of being Defective (versus Good) for Virginia**
  - $40/360 = .1111$
- **Odds of Being Defective (versus Good) for Ohio**
  - $30/570 = .0526$

**Problem 4 – Odds Ratio**

- **Odds ratio comparing Virginia to Ohio for being Defective versus Good**
  - $.1111/.0526 = 2.11$
- **The Virginia plant was twice as likely (2.11) to produce defective soap compared to the Ohio plant**

**Exercise 3.53 on page 136**

- **Ten boxes, one with a crystal**
- **Asking psychics to guess which box has the crystal**

Strategy:

  1. Lay out the sample points
  2. Assign Probabilities
  3. Establish the Event of interest
- a. **If a guess, what is the probability of being correct?**
- b. **Probability of being right at least once in seven tries**

**HINT:** Work with the complement -the probability of being wrong all seven times. Then subtract this from 1.0.