

Agenda

Homework (AP)

Pg.329-330 #63, 68, 72, 73

Homework (reg)

Pg.440 #6.65

Pg.446 #6.71

- Warm Up
- Checkup
 - *Check, copies*
- Independence vs. Disjoint 15 min
- Unscramble 40 min
 - ~~*Check, copies*~~
 - *Consider changing to Gauntlet (from last Spring)*
- The Birthday Problem 10 min
- Hand out Casino Project??
 - ~~*Copies*~~
- Exit Pass 5 min

Warm Up (AP)

In 1912 the luxury liner *Titanic*, on its first voyage across the Atlantic, struck an iceberg and sank. Some passengers got off the ship in lifeboats, but many died. The two-way table gives information about the people who lived and died, by class of travel. Suppose we choose a person at random.

Class	Survived	Died
First	197	122
Second	94	167
Third	151	476

1. What is the probability that a person survived?
2. What is the probability that a person survived, given that they were second class?
3. *Is the event “survived” and the event “second class” independent?*

Reminder

- I have review sessions after school every Thursday.
- This Thursday 3/5 is Unit 4, data collection.
- Saturday 4/25 → full-length practice exam

Checkup

Independent vs. Disjoint, 1 of 2

- Two events are ***independent*** if whether one occurs does not change the probability that the other occurs.

$$P(A) = P(A | B)$$

- *Yes: drawing a Jack, replacing, shuffling, drawing again*
- *No: drawing a Jack, then drawing again*

Doesn't mean they can't affect each other...just end up unchanged.

– *Weird Yes:*

- You flip 3 coins. Let $A = \{\text{Obtain 2+ H's}\} = \{\text{HHT, HTH, THH, HHH}\}$, and $C = \{\text{All flips identical}\} = \{\text{HHH, TTT}\}$.
- $P(A) = \underline{\hspace{2cm}}$
- $P(A | C) = \underline{\hspace{2cm}}$

• ~~Door/Window.~~

~~1. Two events that are probably independent.~~

~~2. Two events that are probably not independent~~

Independent vs. Disjoint, 2 of 2

- Two events are ***disjoint*** (“mutually exclusive”) if they have no outcomes in common.
 - *Yes: drawing a Jack or a Queen*
 - *No: drawing a Jack or a heart*
- Door/Window.
 1. An example of two events that are disjoint
 2. An example of two events that are not disjoint

- *Gauntlet or Unscramble?*
- Either way...
 - Groups of 3-4
 - Winning group → +5 extra credit, Assignments/Checkups

GAUNTLET

- Groups of 3. Choose a Writer.
- Writer answers problems on paper.
- After each problem (#1, #2, #3, etc.), show me.
 - Thumb Up → Flawless.
 - Thumb Down → At least one flaw. You get 1 point.
- Winner = Group with least points.
 - In case of tie, Winner = finished first.
- Each group gets 1 “Free pass” and 2 “Pointers”.

"Unscramble" Game

- Groups of 4.
- Dry-erase marker and whiteboard (or desk)
- I will give your group a problem.
- When everyone in your group has done the problem (*with work shown*), raise your hands.
- Each problem has a letter on the back.
Unscramble all the letters to answer:

What is my daughter's middle name?

+5 extra credit to the winning group.

"Unscramble" Game

- Groups of 4.
- Dry-erase marker and whiteboard (or desk)
- I will give your group a problem.
- When everyone in your group has done the problem (*with work shown*), raise your hands.
- Each problem has a letter on the back.
Unscramble all the letters to answer:

What is my biggest fear?

+5 extra credit to the winning group.

"Unscramble" Game

- Groups of 4.
- Dry-erase marker and whiteboard (or desk)
- I will give your group a problem.
- When everyone in your group has done the problem (*with work shown*), raise your hands.
- Each problem has a letter on the back.

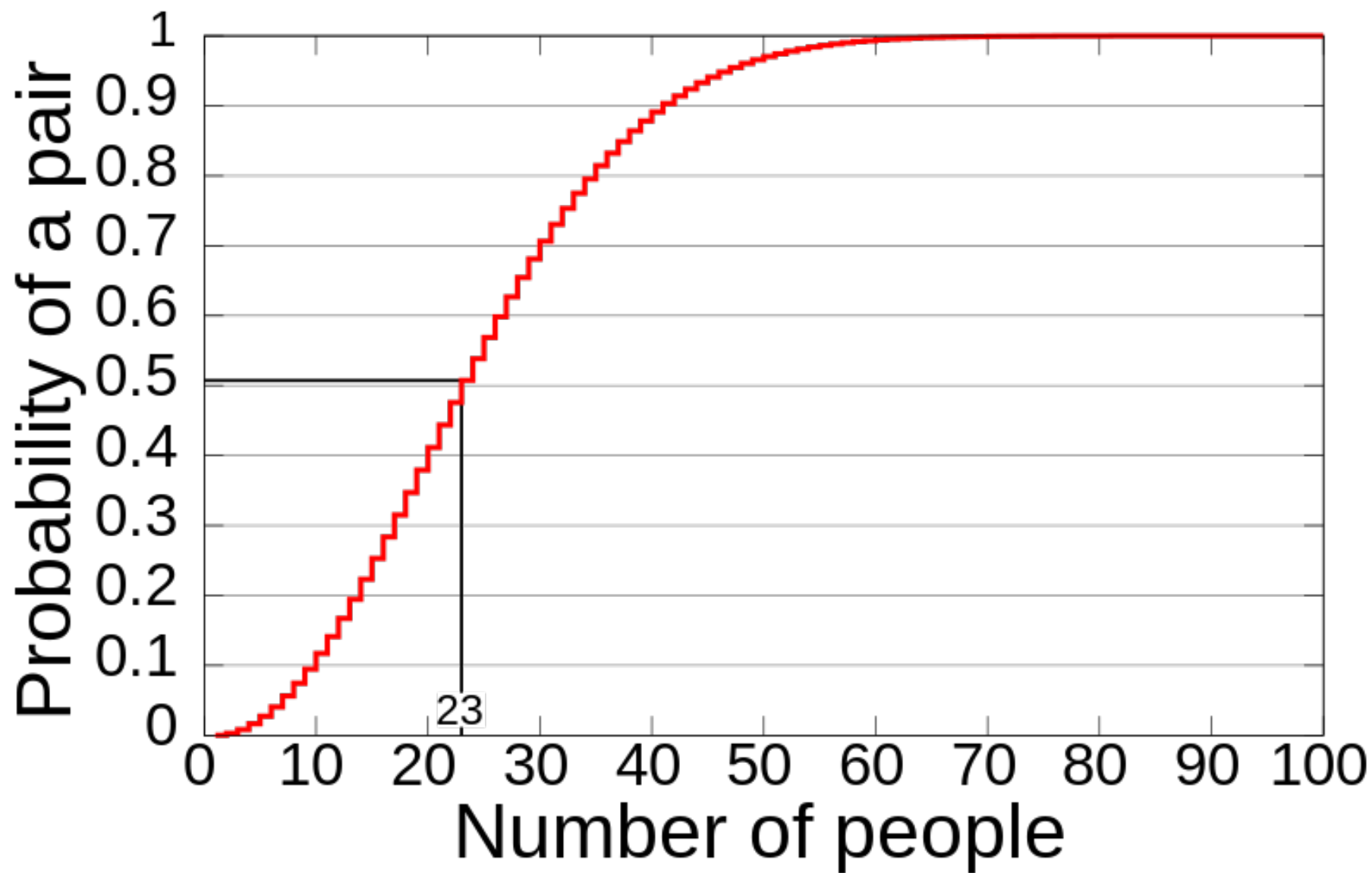
Unscramble all the letters to answer:

**Where am I going on vacation, starting the
first day of summer break?**

+5 extra credit to the winning group.

The Birthday Problem

- When is your birthday? Month, day.
- There are 365 days in a year. Disregard leap years.
- What is the probability that in this class, there would be at least 2 people with the same birthday?
 - Disregard leap years.
 - Assume every birthday is equally probable.



Casino Project (AP)

Create, mathematically analyze, and run a simple gambling game which is significantly (but not obviously) in favor of you, “The House”.

1-2 people (2 recommended)

Up to +5% extra credit for binomial probabilities and/or confidence intervals.

Monday March 9th, due end of class:

1. List three possible ideas for your project. For each game, state how to play and how to win.

Wednesday March 18th (or earlier), due end of class:

2. Choose one game and give it a catchy name. Describe your game (including the title), and calculate its probabilities and expected value.

Tuesday March 24th:

3. Bring an attractive poster that explains your game, including prices and prizes. Bring all components needed for your game.

Thursday March 26th: CASINO DAY!

7. Run your game, attract gamblers, and help them lose their money! You must profit at least \$500 (\$1000 total).

Exit Pass

You work at a pizza shop. You know the following about the 7 pizzas in the oven:

- Three of the pizzas have thick crust. Of those three pizzas, one has only sausage and two have only mushrooms.
- The remaining four pizzas have regular crust. Of those four pizzas, two have only sausage and two have only mushrooms.

1. What is the probability of getting a pizza with a thick crust?
2. What is the probability of getting a pizza with mushrooms?
3. Are the events “thick crust” and “pizza with mushrooms” independent?

The Monty Hall problem

- You are on a game show.
- Doors A, B, and C. Two doors have a giant pile of feces, one door has \$100,000.
- You choose a door.
- Before it is opened, the host opens a different door to reveal a pile of feces.
- He asks if you want to change the door you selected.
- *Do you keep the door you selected, or switch to the other unopened door? Justify with appropriate probability calculations.*

<https://priceonomics.com/the-time-everyone-corrected-the-worlds-smartest/>

CASH IS HERE

You
choose:

Door 1

$1/3$

$1/3$

Door 2

$1/3$

Door 3

