

# Newsletter

## SUPERBOWL 2022 AS STATISTICS IN THE CLASSROOM

by Ambika Silva

More than 70,000 fans attended in person to watch the LA Rams beat the Cincinnati Bengals and become the winners of Super Bowl 2022. I don't regularly watch football (I tend to call Superbowl "Superb Owl" day), but with the Los Angeles Rams playing in LA for Superbowl this year, how could I not watch!? LA won in LA, which was wonderful, but I always watch the ads (who doesn't?) and think to myself about the statistics (again, who doesn't?) of how much is spent and how much viewership the ads have. I thought it would be a good throwback to Feb 2022 to think about the statistics Superbowl LVI gave us.

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## UPCOMING ACTIVITIES

Be sure to check out our upcoming webinar and workshop plans on page 6.



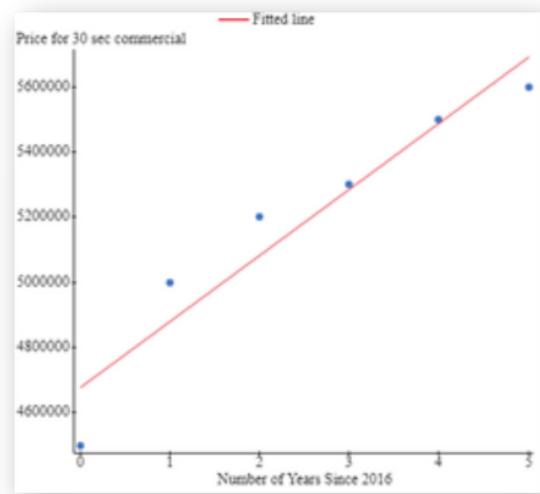
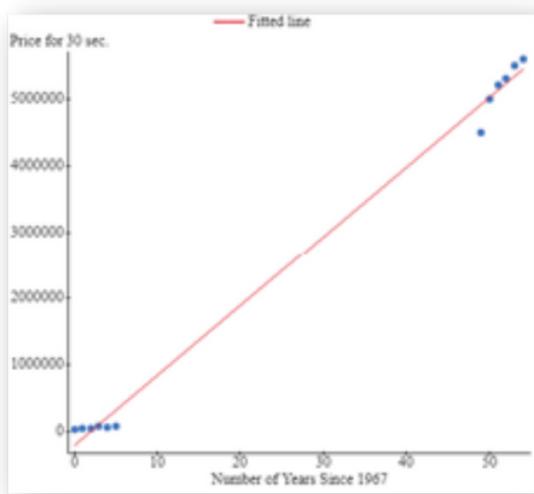


## HAVING STUDENTS THINK ABOUT REGRESSION TO DETERMINE THE COST OF THE 2022 BASED ON PAST DATA.

I have included data from both the far past and the recent future [here](#).

Year	Price for 30 sec.	Year	Price for 30 sec.
1967	\$37,500	2016	\$4,500,000
1968	\$54,500	2017	\$5,000,000
1969	\$55,000	2018	\$5,200,000
1970	\$78,200	2019	\$5,300,000
1971	\$72,500	2020	\$5,500,000
1972	\$86,100	2021	\$5,600,000

I told the class we'd use either all of the data or just the recent data. The class had a discussion on which data set and regression line would yield a more accurate estimate for the cost of a 2022 ad. Some thought more data is always better, some thought that the old data is too outdated. We created graphs:



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Next, I had students use both linear regression lines to determine the best estimate of how much a 2022 thirty-second ad would have cost.

Using just the recent data gave the following linear regression line:

$$\text{Price for 30 sec commercial} = 4676190.5 + 202857.14 \text{ (Number of Years Since 2016)}$$

Estimating 2022 commercials using recent data would be 5,893,333.34 or about 5.9M.

Using both the data from the 60s and 70s as well as the recent data gave the following linear regression line:

$$\text{Price for 30 sec.} = -197424.74 + 104484.25 \text{ Number of Years Since 1967}$$

Estimating 2022 commercials using both recent data and older data would be 5,549,209.01 or about 5.5M.

Using both the data from the 60s and 70s as well as the recent data gave the following linear regression line:

$$\text{Price for 30 sec.} = -197424.74 + 104484.25 \text{ Number of Years Since 1967}$$

Estimating 2022 commercials using both recent data and older data would be 5,549,209.01 or about 5.5M.

[NBC was allegedly selling 2022 Super Bowl ads for record deals](#), closing at \$6.5 million per 30-second commercial. This is a sharp increase from the \$5.5 million asked for in 2021.

Having a discussion with the class on which was more accurate and if they were surprised by the results was our next step. We also talked about whether the \$6.5M price tag was a higher jump than we would have thought. Having these kinds of simple but effective discussions about data and extrapolation was fun for the class! I encourage you to find data sets and explore with your students.

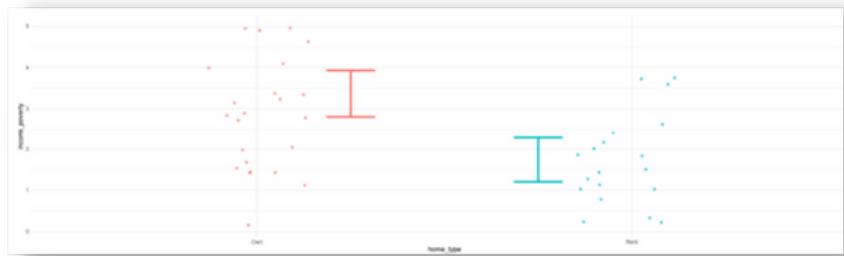
Here's an expanded, but not complete data set:

Year	Cost of a 30-Second Ad						
1967	\$42,500	1990	\$700,400	2015	\$4.25 million	2019	\$5.2 million
1970	\$78,200	1995	\$1.15 million	2016	\$4.8 million	2020	\$5.6 million
1975	\$107,000	2000	\$2.1 million	2017	\$5.4 million	2021	\$5.5 million
1980	\$222,000	2005	\$2.4 million	2018	\$5.24 million	2022	\$6.5 million
1985	\$525,000	2010	\$2.95 million				

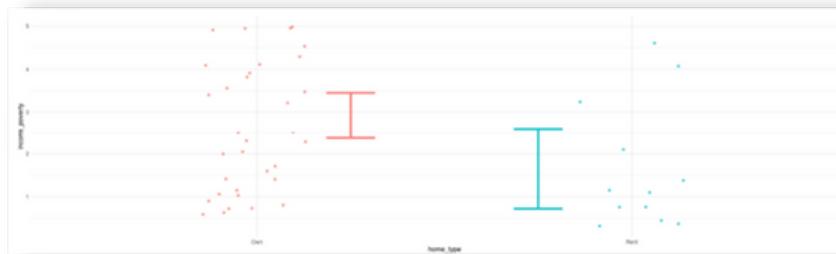
# LITTLE APP ACTIVITY: COMPARING TWO CONFIDENCE INTERVALS

by Kathryn Kozak

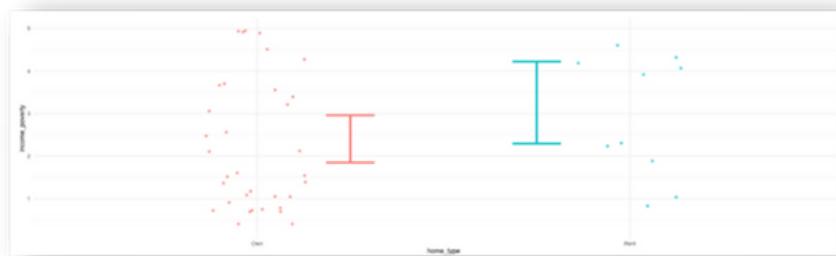
This activity is a great way to introduce comparing two populations by looking at confidence intervals. The activity has the students continue a story from the [Comparing two groups activity](#) where they are looking at the ratio of income in dollars to the poverty level of income using the income\_poverty variable compared to whether the person owns or rents a home using the home\_type variable. The activity called comparing two confidence intervals uses this same story, and has the students consider if the confidence intervals overlap.



The activity asks the students to take more samples to see if the intervals overlap. This helps to reinforce the idea of sampling variability.



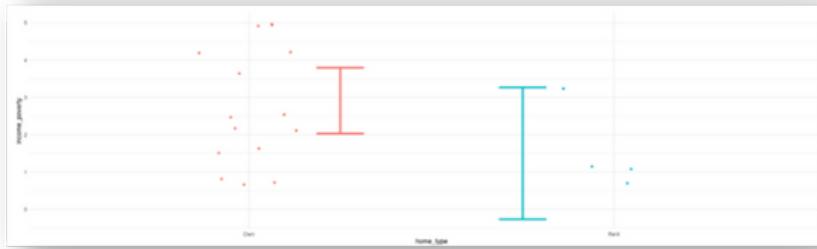
The activity also introduces the students to the idea of randomization using shuffling of the home\_type variable. This is where samples are created regardless of what home\_type is, and then see if there is a difference in income poverty levels. One is assuming there isn't a difference and then see if the intervals overlap. If they consistently do without the distinction of home\_type, but the intervals don't overlap with the home\_type considered, then one could say that there is a difference in poverty levels when home\_type is considered. To aid in this idea, the students are asked to take different samples to see if there overlap of the intervals.



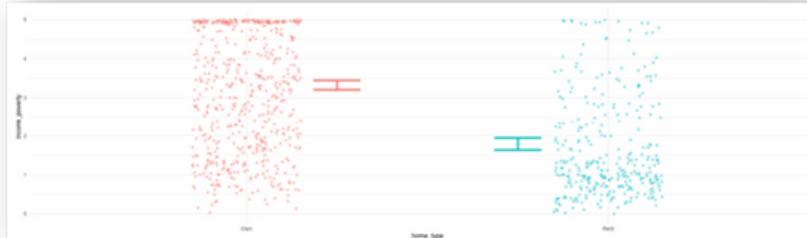
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The activity finishes with students looking at the role of sample size and the length of the confidence interval.

Students start with  $n=20$ .



They then progress up to an  $n=2000$ . There is a slight mistake with this activity. There isn't an  $n=2000$ , so tell the students to use  $n=1000$ . This is a great learning activity where the students have to readjust the directions based on the reality of the situation. One could not tell the students what they should do and see if they can figure out a solution to this situation.



Once the students have created a graph for each sample size, the students then estimate the length of the interval for  $n=20$ ,  $n=200$ , and  $n=1000$ . From this, they developed a conjecture of what the ratio is of the length for  $n=20$  to  $n=200$ . Then they test their conjecture for  $n=200$  to  $n=1000$ . It lets the students realize what effect the sample size has on the length of the confidence interval. The activity [What is a Confidence Interval](#) also has students assessing the sample size, but the Comparing two confidence intervals activity does it in slightly a different way. This gives options for the teacher to introduce and reinforce this concept. The concept of the role of the sample size in the width of a confidence interval is a hard concept for students to understand, so it is useful to have different options for this concept.

This activity is useful for introducing what a confidence interval can describe when working with two populations. It is a great way to start the discussion of inference, and I may use it this semester to introduce the idea of inference in my class. I hope you find it a useful activity to use in your class.

## SPRING FORWARD

by Donna LaLonde

Much of the country “sprung” forward into Daylight Saving Time.

In this spirit, I hope these resources help you spring forward as you continue your semester.

My very talented colleague Claire McKay Bowen wrote an article – “The art of data privacy” for Significance Magazine, and it is freely available [here](#). Claire is currently a Principal Research Associate at the Urban Institute, researching methods of data privacy and confidentiality.



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Data privacy is such an important topic, but it can be difficult to find an introduction. Claire does an amazing job of making this important topic accessible. I also recommend [her book on data privacy](#) - for a deeper dive into this important topic.

Recently I collaborated on a [Data4Kids](#) project which reminded me of the incredible [data resource provided by the Urban Institute](#). The Urban Institute researchers and data scientists curate this repository of open data. An example is the [72 Small and Medium Size Cities Built Environment and Health Equity Dataset](#). My collaborator [Chad Dorsey](#) and I used this dataset for our data story. Although the data story was written for K – 12 students, it might provide some inspiration of how to use the data with your students. And, of course, this is only one example.

At the end of February, I had the pleasure of moderating a panel with 4 wonderful colleagues - Monica Jackson from American University, Kelly McConville from Harvard University, Paul Roback from St. Olaf College, and Maria Tackett from Duke University. The topic was mentoring undergraduate research, and we started a [resource repository](#) which we hope will grow. In addition to many other resources, you will find a link to view the recording of the session. Check it out.

As always – I hope you will share your resources for “springing forward” in the [StatPREP community on MAA Connect!](#)

An advertisement for MAA Connect. It features the MAA Connect logo (a geometric polyhedron icon next to the text "MAA CONNECT") and a background image of a person's hand typing on a keyboard. The main text reads "Join the StatPREP Community". Below this are three teal-colored arrows pointing right, each followed by a step: "Type [connect.maa.org](#) into your browser to get started", "Create an account", and "Find and join the StatPREP Community". At the bottom are three buttons: "Getting Started Video", "Getting Started Guide", and "StatPREP Connect Webinar".

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# Upcoming Webinar

## PAST, PRESENT, FUTURE OF STATPREP

Presented by Kathryn Kozak and Ambika Silva



Thursday, April 21  
4:00pm ET

StatPREP started with the goal of convincing instructors that intro statistics courses should be data-centric! Over the course of the grant, we gave participants access to free tools from StatPREP to help students learn introductory statistics concepts, including Little Apps, along with tutorials that introduce RStudio. In this webinar, we will reflect on both what StatPREP has accomplished and what is on the horizon as we look towards the future.

[REGISTER](#)

## Save the Date!

### 2022 STEM FOR ALL VIDEO SHOWCASE



Save the Dates! May 10th-17th

The StatPREP team is presenting in this year's 2022 STEM for All Video Showcase. Come check out our video between May 10th and 17th in this all virtual video showcase.

Missed last year's video? View it on [maa.org/statprep](http://maa.org/statprep).

[LEARN MORE](#)



# MAA MATHFEST

2022 | PHILADELPHIA, PA

Join StatPREP during August 3-6, 2022, at the Philadelphia Marriott Downtown in Philadelphia, Pennsylvania for MAA MathFest 2022!

Every summer, MAA MathFest presents the latest in mathematical research and education to diverse audiences across the nation. As the largest community of mathematicians, students, and enthusiasts, MAA is proud to bring an interactive, accessible, and informative experience to you this year.

StatPREP will be running a Minicourse at MAA MathFest; see below for more information and spread the word to your colleagues that they may find this helpful!

## UTILIZING STATPREP'S FREE LITTLE APPS TO TEACH DATA-CENTRIC STATISTICS

August 4th, 9-10:50am & August 5th, 10-11:50am

Statistics courses should be data-centric! This mini-course will expose participants to free tools from StatPREP (NSF DUE-1626337) to help students learn introductory statistics concepts. There will be hands-on computer activities utilizing Little Apps along with tutorials that introduce RStudio. This is a great mini-course to attend to learn how to incorporate real data into your course.

To register for MathFest, including the StatPREP Minicourse:

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#### LEADERSHIP TEAM

Mike Brilleslyper, Florida Polytechnic University

Jenna Carpenter, Campbell University

Danny Kaplan, Macalester College

Kathryn Kozak, Coconino Community College

Donna LaLonde, ASA

Ambika Silva, College of the Canyons

Deirdre Longacher Smeltzer, MAA

#### HUB LEADERS

Joe Roith, St. Olaf College, Northfield, MN (2017-18)

Ambika Silva, College of the Canyons, Santa Clarita, CA (2017-18)

Helen Burn, Highline College, Seattle, WA (2018-19)

Hwayeon Ryu, Elon University, Elon, NC (2018-19)

Carol Howald, Howard Community College, Columbia, MD (2019-2020)

Thomas Kinzeler, Tarrant County College, Fort Worth, TX (2019-2020)

Rona Axelrod, Florida SW State College, Fort Myers, FL (2020-2021)