

UNDERGRADUATE MATH SEMINAR

This week's seminar will be at its usual time, with pizza beforehand.

DATE: **Thursday, February 20**

Time & **12:30** – Refreshments in **Bailey 204**

Location: **12:55 – 1:55** Seminar in **Bailey 207**

Mark your calendar. Next week's seminar will be earlier in the week,

Tuesday, February 25, and later in the day: refreshments at **4:15** and seminar talk at **4:45pm**.

Details of each seminar will be posted on the bulletin boards around Bailey Hall.



Pieces from Thesis: Josh Vaidman

*Josh wrote his senior thesis this past fall under the guidance of **Professor Roger Hoerl**.*

The One-Hit Wonders of the National Football League: When I began working on my senior thesis alongside Professor Roger Hoerl, I was eager to explore the intersection of sports and statistics. I chose to pursue a project about something that I was interested in outside of academics, and this proved to be a great decision. I explored an inquiry of determining the most extreme outlier performances within the NFL, and the project turned out to be both a challenging and rewarding endeavor. Here is a glimpse into the experience and what I learned along the way.

Choosing the Topic: The inspiration for my thesis came from friendly competition with my friends and family to see who could recall the most obscure athlete name, and I was interested in applying statistics to this activity. I wanted to explore whether statistical methods could meaningfully quantify and identify standout performances from players who had more middling careers. Outlier performances tended to be a common theme amongst these sorts of players.

Building the Framework: My first challenge was designing a framework for identifying outliers. I decided to analyze player performance data across key metrics, including yards, touchdowns, etc. By using historical NFL data, I calculated career performance averages and standard deviations for each player. To determine outliers, I utilized z-scores, which measure how far a data point is from the mean in terms of standard deviations. The performances were ranked by Z-score, and the highest were the largest outlier performances.

Data Collection and Cleaning: Obtaining accurate, comprehensive data was critical. I compiled NFL performance statistics from online databases. However, raw data often comes with inconsistencies and errors. Cleaning and manipulating this data to fit the needs of the project was one of the most time-consuming aspects of the project.

Insights and Surprises: The final analysis revealed some fascinating patterns. For instance, each of the 14 most significant outlier performances were all from players playing on the road team. Additionally, I discovered that some positions, particularly wide receivers and tight ends, exhibited more variability in performance than others, and were more likely to have outlier performances.

Conclusion: Completing my senior thesis was an incredibly valuable experience. It allowed me to apply mathematical theories to a real-world problem and hone my analytical skills. I'm very grateful for the guidance from Professor Hoerl, and the opportunity to attack a complex problem like this one. For anyone planning their thesis, I strongly suggest choosing a topic that excites you, as that will make the entire process more compelling, and greatly help you with the difficulty and setbacks that you will encounter.