1. Project Overview

This project is a fully functional NFL betting simulation program in Excel, designed to model MoneyLine, spread, and over/under outcomes using historical data, probabilistic modeling, and scenario analysis. The program simulates games across the 2023 and 2024 NFL seasons, providing projected scores, win probabilities, and actionable insights for upcoming matchups.
Timeline: June 2025 – July 2025
Workbook Structure: 10 sheets including raw data, simulations, metrics, and dashboards

2. Data Sources

All data used in this workbook was publicly available from the following sources:

- NFL Offense Scoring Stats 2024: Link
- NFL Defense Receiving Stats 2024: Link
- NFL Defense Rushing Stats 2024: Link
- NFL Standings 2023–2024: Link
- NFL Game Results 2023–2024: Link
- Historical Game Data 2023: Link
- Drive Finder Stats 2023: Link

Note: All datasets are stored in the workbook as separate sheets to ensure reproducibility.

3. Workbook Sheets

Sheet Name	Description
2023 NFL Data	Raw 2023 season team statistics for offense, defense, and special teams
2024 NFL Data	Raw 2024 season team statistics for offense, defense, and special teams
NFL Standings	2023–2024 season standings including wins, losses, and tie-breakers
Game(s) Data	Schedule and results for all games
Team Ratings	Calculated ratings for each team used in simulations
Strength of Schedule	Metrics accounting for opponent difficulty

Team Map	Mapping of team codes and locations for dashboard visualization
Miscellaneous Stats	Derived stats, constants, and probability inputs for simulations
Simulation	Core simulation engine using LET, BINOM.INV, XLOOKUP, and array formulas
Dashboard	Interactive dashboard displaying projected scores, win probabilities, and betting insights

4. Key Formulas & Logic

The simulation uses advanced Excel formulas to model outcomes, combining probability functions, dynamic lookups, and conditional logic.

- LET( ) — Assigns variables for readability and repeated calculations within a single formula.
- BINOM.INV( ) — Generates simulated counts for touchdowns, field goals, 2-point conversions, and safeties.
- XLOOKUP( ) — Retrieves team ratings, stats, and constants from relevant sheets.
- DROP( ) — Excludes header rows or initial data points for cleaner table-based calculations.
- SUMPRODUCT( ) — Performs weighted averages and complex multiplications across arrays (e.g., expected points from multiple scoring outcomes).
- IF( ) — Applies conditional logic for game outcomes, scenario testing, and dashboard visuals.
- SUMIF( ) — Aggregates values by condition (e.g., total points allowed by opponent).
- IFERROR( ) — Handles missing lookups or edge-case calculations gracefully without breaking simulations.
- Array Formulas — Calculate totals and expected scores dynamically across all iterations.
- What-If Analysis (Data Table) — Automates 5,000-iteration simulations per matchup for probability distributions.

5. Workflow

1. **Data Collection & Cleaning:** Use Power Query to pull and standardize datasets from online sources.
2. **Team Rating Calculation:** Generate ratings based on offensive/defensive stats and miscellaneous metrics.
3. **Simulation Engine:** Run probabilistic simulations per game (5,000 iterations) using advanced formulas.

4. **Metric Engineering:** Calculate expected scores, win probabilities, home-field adjustments, Strength of Schedule, and confidence scores.
5. **Dashboard Display:** Summarize outcomes in an interactive dashboard with slicers and dynamic tables.

5. Dashboard Features

The interactive dashboard transforms simulation results into actionable insights for betting and game analysis. Key features include:

- **Team Selection**
    - Dropdowns for selecting **Home** and **Away** teams.
    - Automatically updates all simulated results and visualizations.
- **Score & Win Probability**
    - Displays projected scores for both teams.
    - Shows percentage chance of winning for each side (based on 5,000 simulations).
- **Betting Lines**
    - **Spread**: Displays predicted point spread between the two teams.
    - **Moneyline**: Shows simulated win odds as implied moneyline values.
    - **Total Points (O/U)**: Predicts expected total score for the matchup.
- **Game Range Filter**
    - Date range picker allows users to simulate all games within a selected time frame.
    - Updates dashboard to show only games scheduled between chosen dates.
- **Upcoming Games View**
    - Dynamically populates a list of upcoming games when two dates are selected.
    - Includes simulated scores, spreads, moneylines, and total points for each matchup.
- **User-Friendly Design**
    - Clear visualizations of KPIs (scores, win chance, betting lines).

    - Optimized for decision-making with both numeric and percentage views.

7. Skills Demonstrated

- Data Engineering & Cleaning (Power Query)
- Probabilistic Modeling and Simulation in Excel
- Advanced Formula Construction (LET, BINOM.INV, XLOOKUP, arrays)
- Sports Analytics & Decision Metrics
- Interactive Dashboards and Scenario Analysis