



Statistics in Online Sports Gambling

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Background

- Dating back to Ancient Rome during gladiator battles and chariot races
- Before online:
 - In house betting
 - Bookies
- Professional and Amateur Sports Protection Act (PASPA 1992)
 - Prevented legal sports betting in the USA
 - 2018 US allowed for states to decide for themselves
 - Today 30 states and in D.C. it is legal including Virginia
- Many types of bets
 - Moneyline
 - Parlays
 - Player/team props
 - LeBron Over 22.5 points
 - Spread
 - Wizards +3



Different Forms of Odds

- Fractional (UK)
 - 13/5
 - 3/1
 - 4/5
- Decimal (European)
 - 3.5
 - 2.53
 - 1.5
- Moneyline (US)
 - +230
 - -500
 - +2000


Converting Odds back and forth

Conversion formulas		
x	To	Calculation required
Fractional	Decimal	Step 1: Divide (solve) fraction Step 2: Add 1
Fractional	American	Step 1: Divide (solve) fraction Step 2: If answer ≥ 1 , then $100 \times \text{answer}$ If answer < 1 , then $-100/\text{answer}$
Decimal	Fractional	Step 1: Deduct 1 Step 2: Convert to fraction
Decimal	American	Step 1: If Decimal odd > 2 , then $100 \times (\text{DecimalOdd} - 1)$ If Decimal odd < 2 , then $-100/(\text{DecimalOdd} - 1)$
American	Decimal	Step 1: If American odd > 0 , then $(\text{AmericanOdd}/100) + 1$ If American odd < 0 , then $(-100/\text{AmericanOdd}) + 1$
American	Fractional	Step 1: If American odd > 0 , then $\text{AmericanOdd}/100$ If American odd < 0 , then $-100/\text{AmericanOdd}$

Parlay


- Def: Two or more bets placed together
- Much riskier but more rewarding
- Every bet must hit in order to win

- Bet individually \$1 per bet
 - Payout:
 - $0.87+1.64+0.93+0.82+1+6 = \11.26


5 Team Parlay 

#4481902.18 - 02/13/2021 1:35PM


Philadelphia 76ers At Phoenix Suns

 Ben Simmons Over 22.5 **W** -115
BEN SIMMONS - PTS + REB


Indiana Pacers At Atlanta Hawks

 Domantas Sabonis Double Double/Indiana To Win **W** +164
PLAYER PERFORMANCE DOUBLES


Houston Rockets At New York Knicks

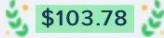
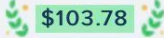
 Eric Gordon Over 27.5 **W** -108
ERIC GORDON - PTS + REB + AST

Brooklyn Nets At Golden State Warriors

 Joe Harris Over 2.5 **W** -122
JOE HARRIS - MADE THREES

Miami Heat At Utah Jazz

 Rudy Gobert Double Double/Utah To Win **W** +100
PLAYER PERFORMANCE DOUBLES

\$3.00 **+3359**  **\$103.78** 

TOTAL WAGER ODDS WON ON FANDUEL



Calculating Parlay Odds

1. Calculate to decimal odds
2. Multiply odds together
3. Multiple then by bet amount
4. Subtract bet amount



Example

- -110, -110, -110
 - $(-100/-110) + 1 = 1.91$
 - $1.91 * 1.91 * 1.91 = 6.97$
 - I bet \$10 so 69.7
 - $69.7 - 10 = 59.7 = +597$ (US)

- +200, -110, +150?



Implied Probability

Simple Formula: Stake/Total Payout

Ex.

- +150 = $100/(150 + 100) = 40\%$
- +230?
 - $100/(230 + 100) = 30.30\%$
- -110?
 - $110/(100 + 110) = 52.38\%$

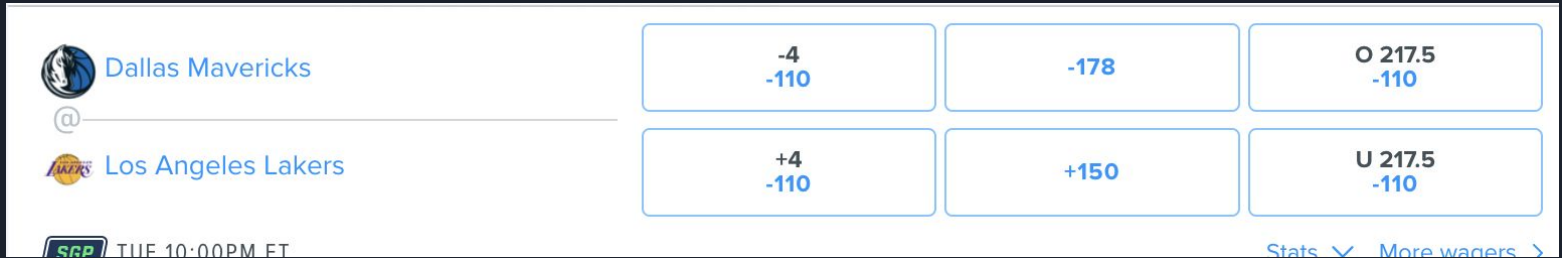
Why the House Always Wins

- Complicated algorithms
 - Lots of variables and inputs
- Irregular bets
 - Bet boost as promotions
- Marketing
- The list goes on but the math can keep it simple



The image shows a sportsbook's odds board with two columns of information. The left column is for the NFL Week 5 games on Sunday, Oct 11, 2009, and the right column is for College Football games on Saturday, Oct 10, 2009. Each row lists a team name, a numerical value (likely the point spread or odds), and a three-digit number (likely the betting line or handle).


SUNDAY, OCT 11, 2009			COLLEGE FOOTBALL		
N.F.L. WEEK #5			SATURDAY, OCT 10, 2009		
401 VIKINGS	-10	-600313	E.MICH.		9
402 RAMS	41	+400314	CENT MICH	-23	
403 COWBOYS	-8	-400315	DUKE		1
404 CHIEFS	42.5	+300316	N C STATE	-16.5	
405 REDSKINS	37.5	+165317	MARYLAND		3
406 PANTHERS	-3.5	-185318	WK FOREST	-12.5	
407 BUCCANEER			319 INDIANA		12
408 EAGLES	-14.5		320 VIRGINIA	-7	
409 RAIDERS			321 PURDUE		
410 GIANTS	-15		322 MINN.	-3	
411 BROWNS	41	+220323	U CONN	46	
412 BILLS	-6	-300324	PITT.	-6.5	

Why the House Always Wins



The screenshot shows a betting interface for a game between the Dallas Mavericks and the Los Angeles Lakers. The Mavericks are listed as the home team with a -4 point spread and -110 odds. The Lakers are listed as the away team with a +4 point spread and -110 odds. There are also over/under bets for 217.5 points, with over (-110) and under (-110) options. The game is scheduled for Tuesday at 10:00 PM ET. There are links for 'Stats' and 'More wagers'.

 Dallas Mavericks	-4 -110	-178	O 217.5 -110
@  Los Angeles Lakers	+4 -110	+150	U 217.5 -110

 TUE 10:00PM ET [Stats](#) [More wagers](#)

- Dallas Mavericks Implied Probability to Win
 - $178 / (100 + 178) = 64\%$
- Los Angeles Lakers Implied Probability to Win
 - $100 / (150 + 100) = 40\%$
- Total of 104%
 - Odds are not fair odds
 - $4 / 104 = 3.85\%$ expected profit to the house



Questions?



Sources

- <https://www.investopedia.com/articles/dictionary/042215/understand-math-behind-betting-odds-gambling.asp>
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