

## Pythagorean Expectation

As is true in other sports, we know that a team's [point differential is a better indicator of future win-loss record](#) than its actual win-loss record. We can produce an "expected" win total for each NFL team, given its point differential, by running the Pythagorean Expectation formula --  $\text{Points For}^{2.37} / (\text{Points For}^{2.37} + \text{Points Against}^{2.37})$  -- and multiplying it by 16, for the number of games in a season. Ever since Bill James created this for baseball and [Houston Rockets general manager Daryl Morey](#) modified it for football, the results have shown that winning more games than your Pythagorean Expectation tends to mean a team will decline the following season, while falling short of expectations tends to mean a team will improve.

Interestingly enough, last year the teams that were most likely to decline after outperforming their numbers in 2014 -- Arizona and Cincinnati -- both improved, thanks to much better quarterback play. The teams just behind them in the top five were Detroit, Dallas and Pittsburgh, each of which did decline. On the flip side, there were six teams that underperformed their Pythagorean Expectation by one win or more last season, and of those six, only the Giants (who maintained a 6-10 record) failed to improve. The other five teams (Tampa, Atlanta, Kansas City, St. Louis and Tennessee) improved by an average of two wins each.

### Best, worst Pythagorean Differential (2015)

Team	Record	Pyth	Wins	Diff	Team	Record	Pyth	Exp	Diff
Panthers	15-1	12.1		+2.9	Chargers	4-12	6		-2
Broncos	12-4	9.7		+2.3	Titans	3-13	4.9		-1.9
Colts	8-8	6.1		+1.9	Seahawks	10-6	11.7		-1.7
Vikings	11-5	9.8		+1.2	Giants	6-10	7.5		-1.5
49ers	5-11	3.8		+1.2	Jaguars	5-11	6.4		-1.4

The 2015 Pythagorean Expectation numbers suggest that the two Super Bowl teams exceeded their expected wins the most. That shouldn't necessarily be a surprise for the Panthers: Teams that win as many games as Carolina did last season are always outperforming their Pythagorean Expectation because it's virtually impossible to have the point differential of a "true" 15-win team. (The best point differential since the AFL-NFL merger belongs to the 2007 Patriots, who went 16-0 with the Pythagorean Expectation of a 13.8-win team.)

Too many things have to go right to make that happen again, even with a talented roster. Of the 23 other teams that won 14 or more games since the league went to a 16-game slate in 1978, 21 declined and zero improved. The teams won an average of 10.7 games the following year. Only the 1990 49ers and 2003 Patriots managed to maintain their previous records. The Panthers will be good in 2016, but it's reasonable to expect them to decline. The Broncos, who underwent a lot of roster turnover and have major questions at quarterback, will find it tough to win 12 games again. Let's just say a prayer for the 49ers, who are being described as lucky for the first time in several years.

The team most likely to improve in 2016 is the Chargers, who fell short of their expected win total by almost exactly two full wins. Since 1989, 62 teams have fallen in the range of underperforming by 1.5 to 2.5 wins. Forty-nine of those teams (79 percent) won more games the following year, and the group as a whole improved by an average of 2.3 wins. The Seahawks' fitting into that bucket might also be scary for Cardinals fans. Although Arizona won the division by three games, the Cardinals' Pythagorean Expectation (11.9 wins) was just narrowly ahead of Seattle's (11.7 wins).