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Stanley Rothman* (stanley.rothman@quinnipiac.edu), Quinnipiac University, Hamden, CT 06518. *New Theorems to Predict Winning Percentages and Compare Parity in the MLB, NBA, and NFL*. Preliminary report.

My talk will introduce a new extension to my prior research on the concept of predicting a team's actual winning percentage ($Y = W\%$) using $X = RS-RA$ in baseball and (PS-PA) in the NBA and NFL. The first major result was Bill James' Pythagorean Formula of Baseball which states $W\% = (RS)^2 / ((RS)^2 + (RA)^2)$. Other researchers found the exponents 2.37 and 13.91 work for the NFL and NBA. Using linear regression I developed the Linear Formula for Baseball $W\% = .000673*(RS - RA) + 1/2$. Wanting to extend my linear formula to the other professional leagues led me to create a new General Linear Theorem. As a corollary to my Linear Theorem, new linear equations for the MLB, NBA, and NFL were established. I showed these three equations were accurate for the MLB since 1901 and for the other leagues after their mergers. Using prediction intervals from these linear equations, at any point in a season, we can identify under-performing and over-performing teams. Finally, my newest theorem shows, that after normalizing both the X and Y above, the slopes of the new linear equations for any league for any year are the correlation coefficients from the original linear equations for X and Y. The results of this new theorem are then used to examine which sports league has the most parity. (Received July 25, 2017)