LSU E. J. OURSO COLLEGE OF BUSINESS

Dr. Chun's Numb3rs & L∅gic

Best of n Playoff Series

Young H. Chun, Ph.D.

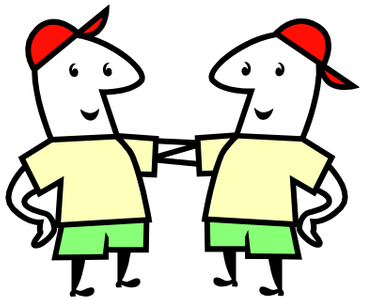
***Professor of Decision Science* &**
Cherie H. Flores Endowed Chair in MBA Studies

Best of *n* Playoff Series

The "best-of" format refers to a head-to-head competition where the two teams compete to first win the majority of the games allotted to win the "series".

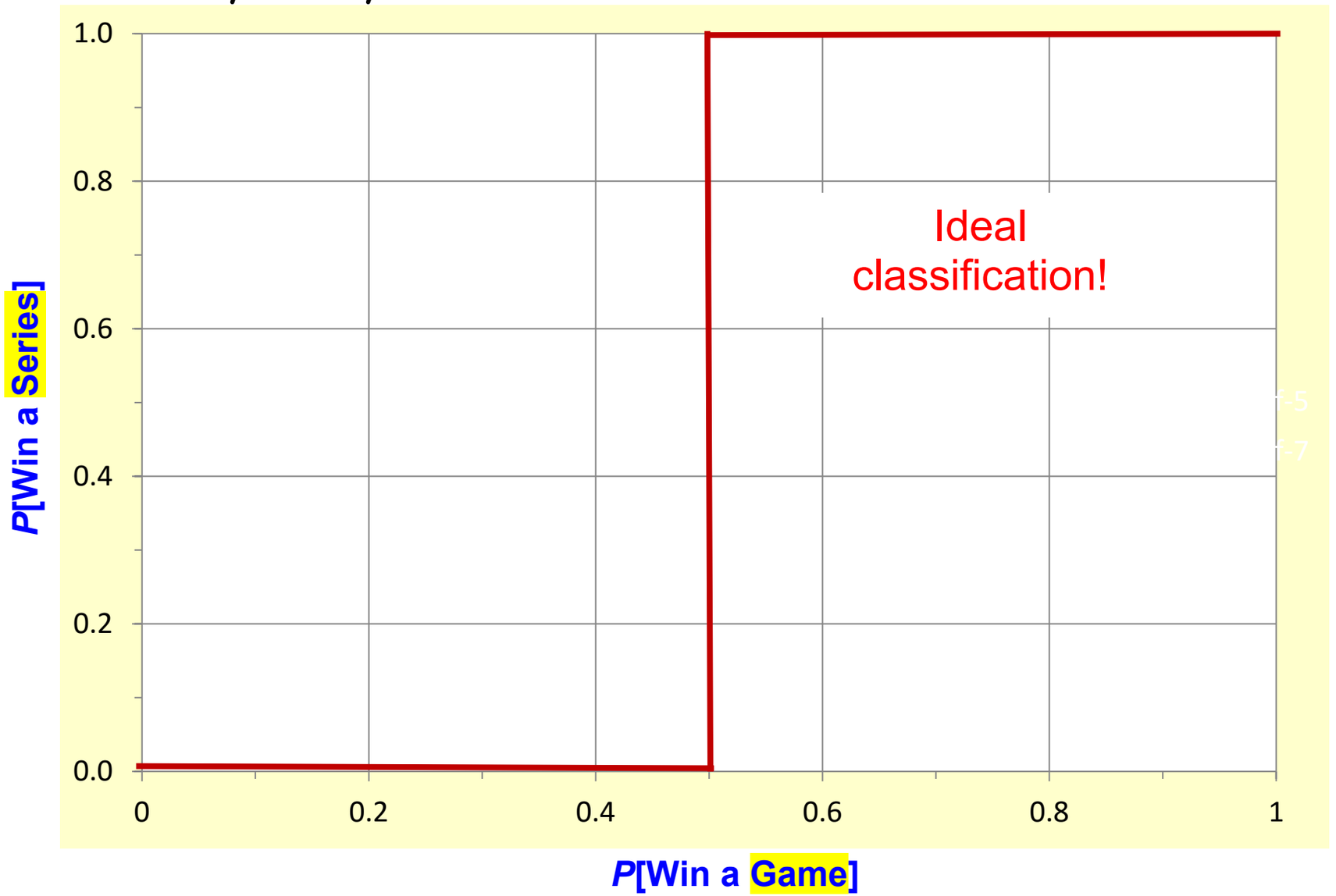
If a competitor wins a majority of the games, the remaining games may be discarded. This is a modification of the single elimination tournament to allow more matches to be held.

Moreover, if it can be said that one team has a higher probability of winning a single game, the likelihood that this team wins the series increases when more games are played.



For example, if team A has a 70% chance of winning team B in a single game, its probability of winning a best-of-three series against B is 78.4%, and its probability of winning a best-of-seven series is about 87.4%.

- Probability that your team wins a series:



- A better team should win the championship series!

- Notation

  p = Probability that your team wins a single game

- Probability that your team wins a series

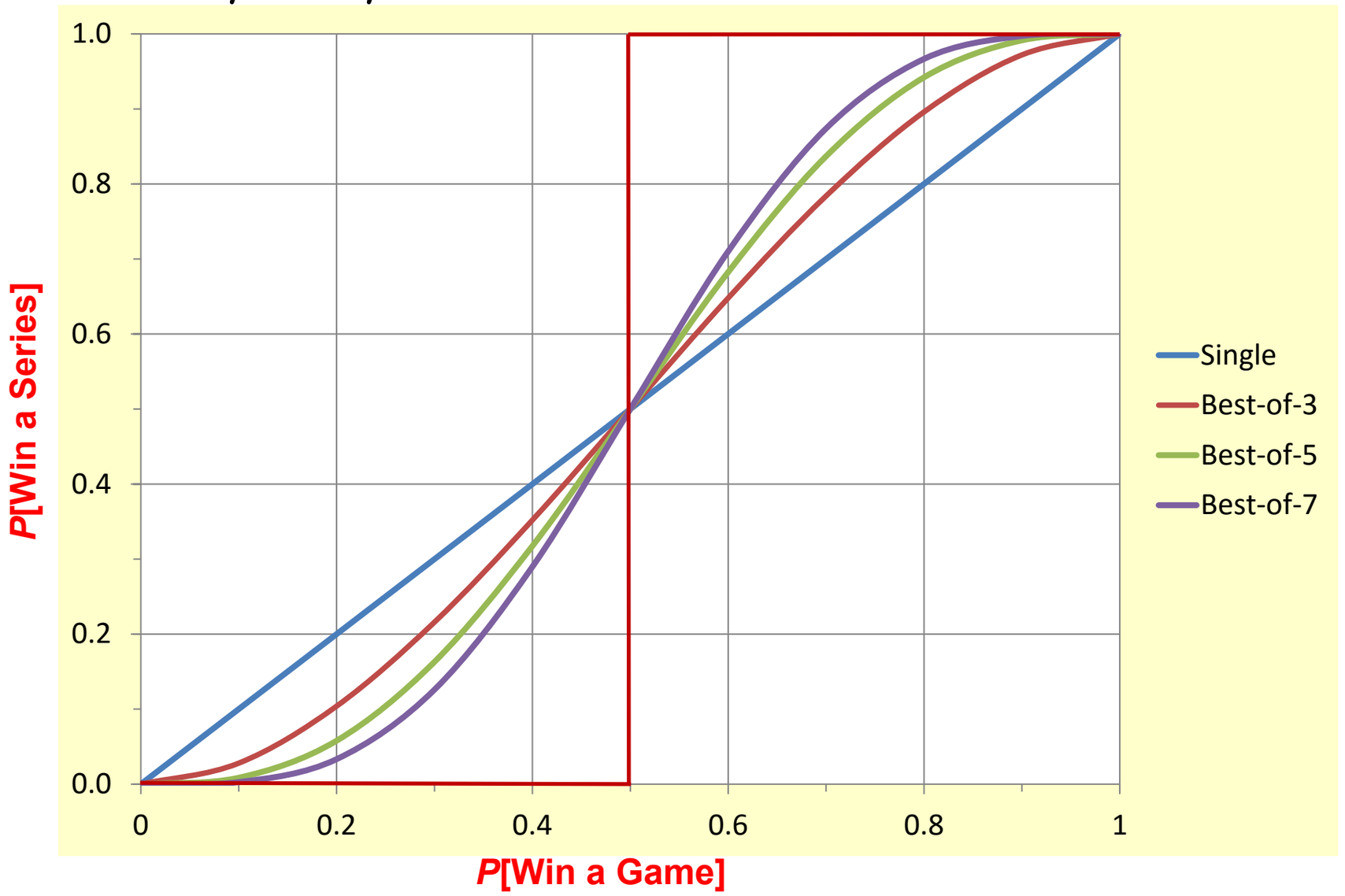
Number of games	Single game	Best-of-3	Best-of-5	Best-of-7
1	p	-	-	-
2		$C(1, 1)*p^2*q^0$	-	-
3		$C(2, 1)*p^2*q^1$	$C(2, 2)*p^3*q^0$	-
4			$C(3, 2)*p^3*q^1$	$C(3, 3)*p^4*q^0$
5			$C(4, 2)*p^3*q^2$	$C(4, 3)*p^4*q^1$
6				$C(5, 3)*p^4*q^2$
7				$C(6, 3)*p^4*q^3$
Total	p	$p^2(1+2q)$	$p^3(1+3q+6q^2)$	$p^4(1+4q+10q^2+20q^3)$

- Probability that your team wins a *series*:

p	Single game	Best-of-3	Best-of-5	**Best-of-7**
0.0	0.000	0.000	0.000	**0.000**
0.1	0.100	0.028	0.009	**0.003**
0.2	0.200	0.104	0.058	**0.033**
0.3	0.300	0.216	0.163	**0.126**
0.4	0.400	0.352	0.317	**0.290**
0.5	0.500	0.500	0.500	**0.500**
0.6	0.600	0.648	0.683	**0.710**
0.7	0.700	0.784	0.837	**0.874**
0.8	0.800	0.896	0.942	**0.967**
0.9	0.900	0.972	0.991	**0.997**
1.0	1.000	1.000	1.000	**1.000**

We assume that *p* is constant and each game is independent!

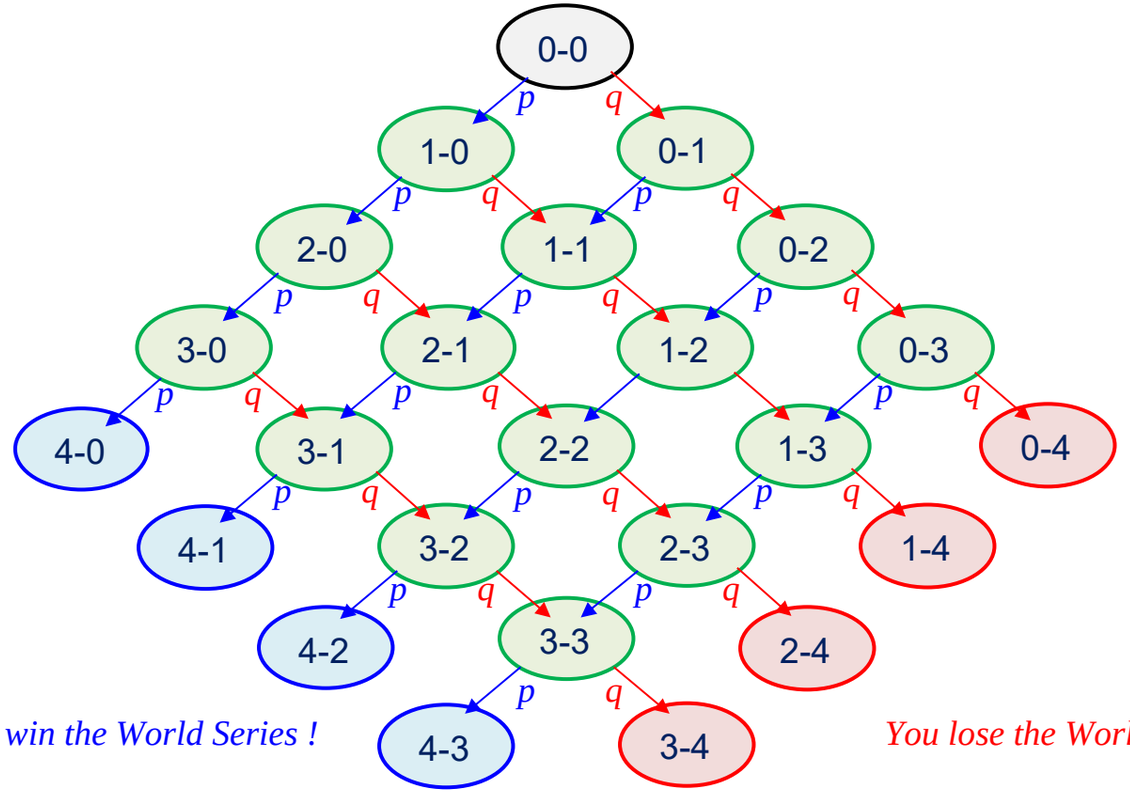
- Probability that your team wins a series:



The more games, the less upset!

Best-of-Seven Playoff Series

* Markov Chain



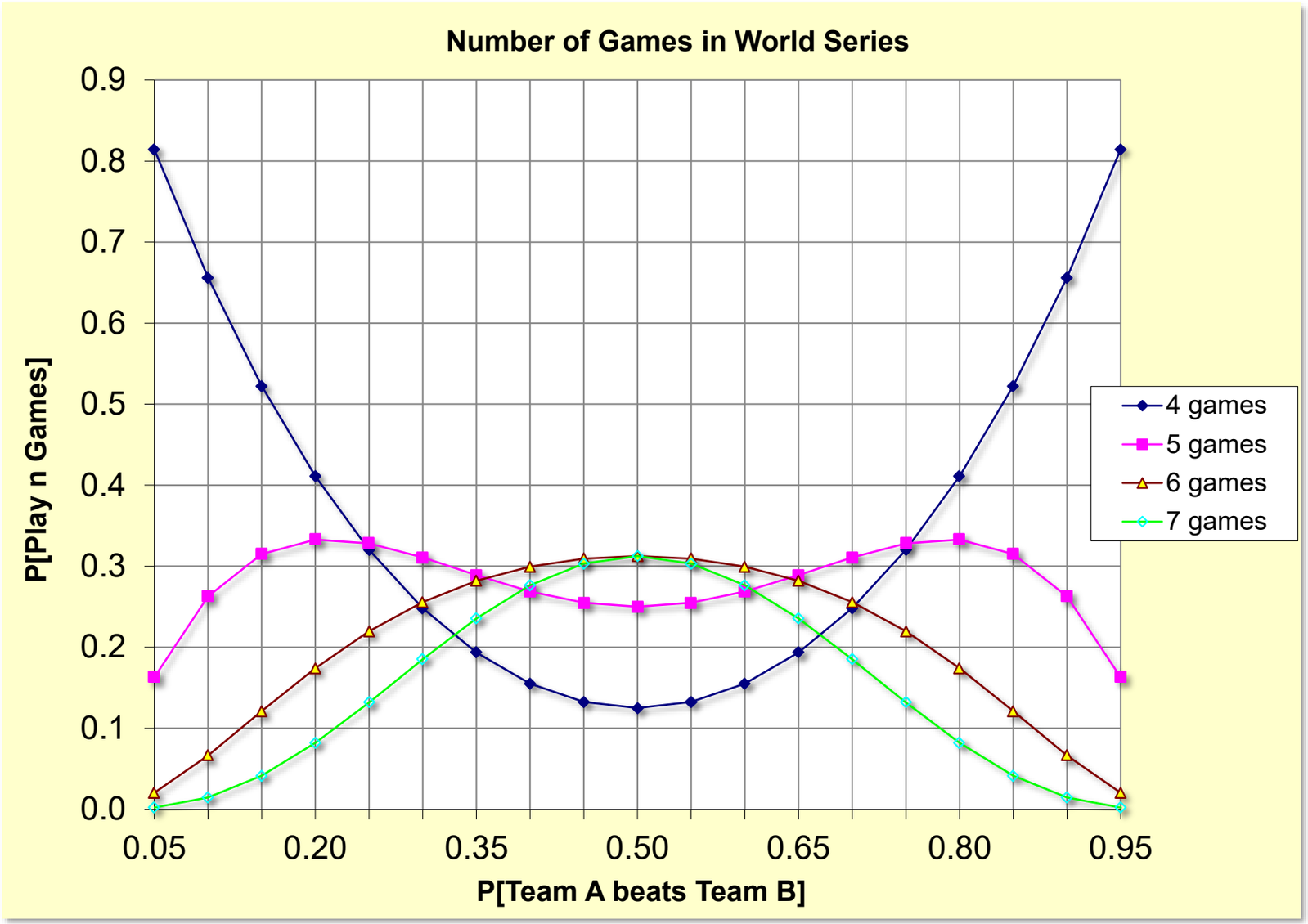
* Total number of games?

  4, 5, 6, or 7 games, depending on *p*.

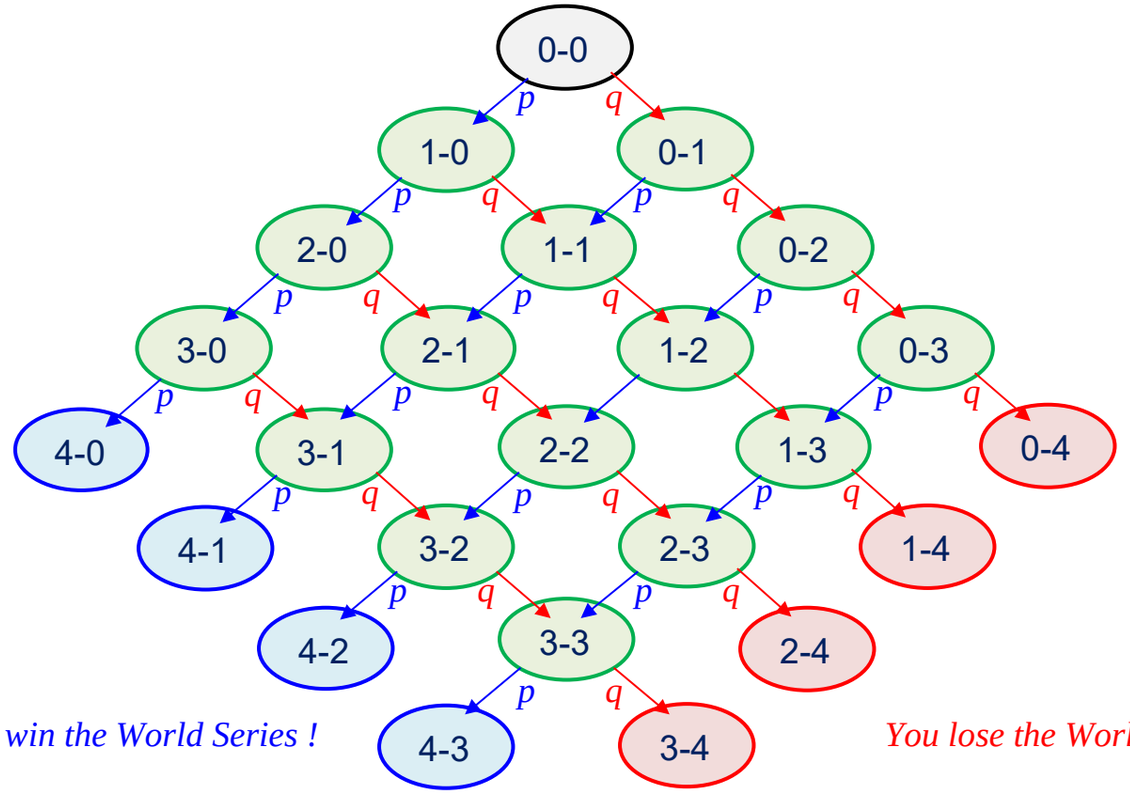
* Total number of games in the World Series

p	*q*	4	5	6	7	E[n]
0.0	1.0	**1.0000**	0.0000	0.0000	0.0000	**4.0000**
0.1	0.9	0.6562	0.2628	0.0664	0.0146	4.4394
0.2	0.8	0.4112	0.3328	0.1741	0.0819	4.9267
0.3	0.7	0.2482	0.3108	0.2558	0.1852	5.3780
0.4	0.6	0.1552	0.2688	0.2995	0.2765	5.6973
0.5	0.5	0.1250	0.2500	**0.3125**	**0.3125**	5.8125
0.6	0.4	0.1552	0.2688	0.2995	0.2765	5.6973
0.7	0.3	0.2482	0.3108	0.2558	0.1852	5.3780
0.8	0.2	0.4112	0.3328	0.1741	0.0819	4.9267
0.9	0.1	0.6562	0.2628	0.0664	0.0146	4.4394
1.0	0.0	**1.0000**	0.0000	0.0000	0.0000	**4.0000**

* Total number of games in the World Series



* Basic assumptions



(1) *p* is constant and

(2) each game is independent !

Best of Seven Playoff Series

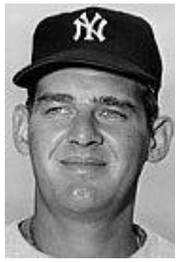
Hal Stern, "Best-of-seven playoff series," *Chance Magazine* 11.2 (Spring 1998)

Professor Hal Stern examines these assumptions using the data on baseball. He concludes that the *independence* assumption is still reasonable, but the *constant probability* is not. One reason for this is that the home team advantage in baseball seems real.

(a) If you assume a binomial model for a World series between the Yankees and the Dodgers with the Yankees having a probability 0.6 for winning each game, how likely do you think it is that the Yankees will win the series? (5 points)

p	Single game	Best-of-3	Best-of-5	**Best-of-7**
0.0	0.000	0.000	0.000	**0.000**
0.2	0.200	0.104	0.058	**0.033**
0.4	0.400	0.352	0.317	**0.290**
0.6	0.600	0.648	0.683	**0.710**
0.8	0.800	0.896	0.942	**0.967**
1.0	1.000	1.000	1.000	**1.000**

(b) Who pitches a perfect game against the Brooklyn Dodgers in the 1956 World Series? (45 points)



NY Yankee **Don Larsen.**

(c) Who hit a home run in the bottom of the 9th inning of the 7th game, scoring the 1960 World Series-winning run over the New York Yankees? (50 points)

Pittsburgh Pirates **Bill Mazeroski**

You will see this type of problems in the final exam !

Movie Trivia

An Iowa corn farmer, hearing voices, interprets them as a command
to build a baseball diamond in his fields;
he does, and the Chicago Black Sox come.

Field of Dreams (1989)

An Iowa corn farmer, hearing voices, interprets them as a command
to build a baseball diamond in his fields;
he does, and the Chicago Black Sox come.