

Problem 12.16 A study of D. Kadell and D. Ylvisaker entitled “Lotto play: the good, the fair and the truly awful,” *Chance Magazine* 4 (1991): 22–25 analyzes the behavior of players in the lotto. They took 111,221,666 tickets that were manually filled in for a specific draw of the California Lotto 6/53 and counted how many combinations were filled in exactly k times for $k = 0, 1, \dots, 20$.

k	N_k	k	N_k
0	288,590	11	217,903
1	1,213,688	12	126,952
2	2,579,112	13	77,409
3	3,702,310	14	50,098
4	4,052,043	15	33,699
5	3,622,666	16	23,779
6	2,768,134	17	17,483
7	1,876,056	18	13,146
8	1,161,423	19	10,158
9	677,368	20	7,969
10	384,186	> 20	53,308

In the table we give the observed values of the N_k , where N_k denotes the number of combinations filled in k times. Use a chi-square test to find out whether the picks chosen by the players are random or not.