



Poker Cards Analysis – April 2025

The Directors

Entain Plc

This is to confirm that iTech Labs has examined the game logs for Poker games for the period **April 01, 2025, to April 30, 2025** as recorded by the respective game servers and analyzed the Poker cards for statistical randomness. The results of the analysis are given below.

For details on the gaming sites serviced by the Entain Plc game servers and used in this audit refer to the [List](#).

1. Poker hand types statistics

These calculations were done for Royal Flush, Straight Flush, Four of a Kind, Full House, Flush, Straight, 3 of a Kind, 2 pairs, 1 Pair, High Card.

The Poker hand types analysis involved creating subsets of data and conducting Chi-square tests on each subset.

The null hypothesis for the chi-square test is that the observed frequencies of each type of hand matches the theoretical values for a deck that has been shuffled using a perfect random number generator. The p-values observed in these multiple tests are expected to follow a uniform distribution for the range 0.0 to 1.0.

The analysis performs a KS Test (Kolmogorov-Smirnov test) for uniform distribution on the observed p-values, and the combined p-value result of this test is taken as the final result of the Poker hand types statistics tests.

1.1 Poker hand types statistics for 52 cards deck:

Test No.	DOF	ChiSqr	P-Value
1	9	5.85	0.75518
2	9	13.08	0.15917
3	9	4.80	0.85140
4	9	5.91	0.74924
5	9	7.40	0.59521
6	9	7.38	0.59730
7	9	5.75	0.76440
8	9	6.11	0.72898
9	9	6.84	0.65413
10	9	3.39	0.94663
11	9	9.60	0.38380
12	9	7.27	0.60893
13	9	5.21	0.81551
14	9	8.20	0.51449
15	9	4.00	0.91135
16	9	18.99	0.02530
17	9	13.73	0.13218
18	9	5.57	0.78222
19	9	3.39	0.94694
20	9	8.42	0.49272
21	9	4.81	0.85065
22	9	11.13	0.26677
23	9	6.51	0.68838
24	9	8.02	0.53258
25	9	22.19	0.00831
26	9	22.93	0.00636
27	9	2.00	0.99143

28	9	9.13	0.42551
29	9	16.11	0.06455
30	9	14.29	0.11252
31	9	5.77	0.76276
32	9	14.20	0.11530
33	9	9.60	0.38408
34	9	8.89	0.44775
35	9	5.21	0.81577
36	9	13.75	0.13154
37	9	5.55	0.78387
38	9	13.86	0.12725
39	9	5.76	0.76343
40	9	3.75	0.92683
41	9	9.29	0.41135
42	9	9.07	0.43130
43	9	5.56	0.78316
44	9	7.06	0.63079
45	9	5.53	0.78562
46	9	3.44	0.94403
47	9	7.71	0.56394
48	9	16.10	0.06479
49	9	8.80	0.45569
50	9	12.39	0.19223
51	9	8.10	0.52373
52	9	10.59	0.30454
53	9	6.66	0.67259
54	9	19.64	0.02030
55	9	12.13	0.20602
56	9	11.59	0.23736
57	9	4.31	0.88977
58	9	11.42	0.24791
59	9	6.15	0.72444
60	9	19.63	0.02032
61	9	6.03	0.73719
62	9	17.13	0.04677
63	9	9.08	0.42966
64	9	11.61	0.23614
65	9	10.35	0.32260
66	9	7.84	0.54988
67	9	9.64	0.38039
68	9	8.62	0.47339
69	9	3.08	0.96103
70	9	3.52	0.93989
71	9	10.62	0.30261
72	9	4.28	0.89168
73	9	8.75	0.46040
74	9	9.62	0.38216
75	9	3.13	0.95909
76	9	15.60	0.07568
77	9	11.99	0.21363
78	9	4.78	0.85320
79	9	5.82	0.75760
80	9	10.74	0.29425
81	9	8.12	0.52192
82	9	6.02	0.73770
83	9	12.32	0.19605

84	9	10.34	0.32345
85	9	5.78	0.76148
86	9	12.37	0.19308
87	9	8.73	0.46264
88	9	7.88	0.54647
89	9	12.58	0.18259
90	9	8.86	0.44993
91	9	7.48	0.58748
92	9	8.29	0.50492
93	9	8.12	0.52240
94	9	9.56	0.38687
95	9	4.35	0.88724
96	9	5.55	0.78351
97	9	4.49	0.87601
98	9	21.21	0.01174
99	9	3.83	0.92223
100	9	5.22	0.81509
Combined P-value for all tests (Using KS method)			
			0.45701

Notes:

- 1) The P-values are observed probabilities from the Chi-Square tests. The last row shows the result of the KS Test performed on the p-values for all Chi-Square tests, where there are sufficient data.

2. Poker rank statistics

The Poker rank analysis aims to establish that the rank of the cards in each position was equally distributed in one of the 13 possible ranks (2, 3, 4, 5, 6, 7, 8, 9, 10, J, Q, K, A) for a 52 card deck.

The Poker rank analysis involved creating subsets of data and conducting Chi-square tests on each subset. The analysis performs a KS Test (Kolmogorov-Smirnov test) for uniform distribution on the observed p-values, and the combined p-value result of this test is taken as the final result of the Ranks statistics tests.

2.1 Poker rank statistics for 52 cards deck:

Test No.	DOF	ChiSqr	P-Value
1	84	79.24	0.62658
2	84	98.72	0.12998
3	84	79.58	0.61621
4	84	84.32	0.46980
5	84	80.89	0.57574
6	84	70.58	0.85174
7	84	68.13	0.89605
8	84	74.44	0.76287
9	84	73.57	0.78490
10	84	97.12	0.15515
11	84	101.60	0.09281
12	84	85.98	0.41970
13	84	92.73	0.24109
14	84	122.45	0.00396
15	84	72.89	0.80128
16	84	110.66	0.02728
17	84	74.42	0.76331
18	84	73.94	0.77551
19	84	83.70	0.48866
20	84	93.75	0.21882
21	84	92.16	0.25413
22	84	61.35	0.97011
23	84	63.90	0.94974
24	84	79.89	0.60658

25	84	68.58	0.88865
26	84	74.87	0.75158
27	84	72.36	0.81348
28	84	123.96	0.00301
29	84	105.72	0.05478
30	84	93.22	0.23023
31	84	66.28	0.92283
32	84	89.24	0.32733
33	84	69.49	0.87263
34	84	93.98	0.21413
35	84	88.60	0.34460
36	84	88.49	0.34754
37	84	78.85	0.63845
38	84	82.89	0.51381
39	84	106.55	0.04898
40	84	77.22	0.68660
41	84	79.02	0.63320
42	84	98.66	0.13090
43	84	66.50	0.91993
44	84	111.54	0.02392
45	84	79.81	0.60929
46	84	59.53	0.98017
47	84	71.17	0.83967
48	84	77.87	0.66751
49	84	84.14	0.47518
50	84	86.97	0.39069
51	84	101.22	0.09721
52	84	62.81	0.95941
53	84	71.82	0.82563
54	84	83.56	0.49287
55	84	80.99	0.57287
56	84	110.61	0.02749
57	84	80.45	0.58953
58	84	98.37	0.13528
59	84	63.56	0.95300
60	84	70.78	0.84770
61	84	79.57	0.61659
62	84	99.03	0.12555
63	84	90.80	0.28698
64	84	67.46	0.90641
65	84	94.95	0.19437
66	84	109.21	0.03370
67	84	89.51	0.32008
68	84	109.72	0.03132
69	84	91.48	0.27031
70	84	72.68	0.80630
71	84	70.31	0.85716
72	84	93.44	0.22542
73	84	92.66	0.24275
74	84	75.33	0.73943
75	84	75.95	0.72246
76	84	65.42	0.93357
77	84	86.37	0.40804
78	84	80.49	0.58834
79	84	75.83	0.72565
80	84	96.64	0.16335

81	84	66.45	0.92060
82	84	86.50	0.40438
83	84	91.24	0.27621
84	84	87.05	0.38836
85	84	97.78	0.14435
86	84	117.92	0.00866
87	84	104.21	0.06681
88	84	85.19	0.44313
89	84	81.90	0.54459
90	84	94.04	0.21286
91	84	69.97	0.86374
92	84	84.36	0.46850
93	84	74.25	0.76768
94	84	87.13	0.38608
95	84	70.05	0.86218
96	84	89.52	0.31981
97	84	70.92	0.84489
98	84	101.09	0.09869
99	84	111.00	0.02593
100	84	85.17	0.44385
Combined P-value for all tests (Using KS method)			0.93654

Notes:

- 1) The P-values are observed probabilities from the Chi-Square tests. The last row shows the result of the KS Test performed on the p-values for all Chi-Square tests, where there are sufficient data.

3. Poker suits statistics

The Poker suits analysis aims to verify that the cards dealt exhibit an equal probability of all 4 suits (Clubs, Diamonds, Hearts and Spades) in all positions.

The Poker suits analysis involved creating subsets of data and conducting Chi-square tests on each subset. The analysis performs a KS Test (Kolmogorov-Smirnov test) for uniform distribution on the observed p-values, and the combined p-value result of this test is taken as the final result of the Suits statistics tests.

3.1 Poker suits statistics for 52 cards deck:

Test No.	Positions	DOF	ChiSqr	P-Value
1	7	21	19.73	0.53850
2	7	21	16.62	0.73405
3	7	21	21.65	0.42018
4	7	21	10.91	0.96450
5	7	21	30.74	0.07812
6	7	21	17.99	0.64936
7	7	21	39.29	0.00905
8	7	21	23.05	0.34111
9	7	21	12.14	0.93587
10	7	21	15.18	0.81401
11	7	21	22.27	0.38399
12	7	21	12.80	0.91549
13	7	21	19.73	0.53811
14	7	21	10.97	0.96329
15	7	21	36.20	0.02077
16	7	21	16.23	0.75680
17	7	21	15.20	0.81254
18	7	21	18.09	0.64305
19	7	21	10.89	0.96491
20	7	21	22.57	0.36736
21	7	21	20.41	0.49516
22	7	21	15.40	0.80222

23	7	21	12.11	0.93660
24	7	21	16.23	0.75632
25	7	21	17.85	0.65828
26	7	21	20.88	0.46628
27	7	21	17.49	0.68092
28	7	21	16.07	0.76592
29	7	21	24.33	0.27725
30	7	21	20.78	0.47236
31	7	21	23.97	0.29435
32	7	21	20.86	0.46774
33	7	21	20.46	0.49259
34	7	21	35.11	0.02743
35	7	21	18.56	0.61363
36	7	21	18.48	0.61859
37	7	21	36.85	0.01750
38	7	21	27.12	0.16705
39	7	21	21.98	0.40065
40	7	21	12.96	0.91017
41	7	21	18.27	0.63214
42	7	21	20.97	0.46087
43	7	21	18.44	0.62102
44	7	21	21.79	0.41178
45	7	21	21.54	0.42613
46	7	21	19.75	0.53732
47	7	21	20.71	0.47704
48	7	21	22.76	0.35670
49	7	21	14.90	0.82776
50	7	21	15.16	0.81496
51	7	21	32.55	0.05146
52	7	21	17.18	0.70004
53	7	21	28.67	0.12227
54	7	21	20.72	0.47637
55	7	21	21.95	0.40211
56	7	21	20.99	0.45946
57	7	21	14.75	0.83542
58	7	21	25.94	0.20862
59	7	21	24.89	0.25185
60	7	21	14.39	0.85220
61	7	21	25.48	0.22710
62	7	21	22.45	0.37392
63	7	21	19.07	0.58038
64	7	21	26.63	0.18339
65	7	21	15.61	0.79130
66	7	21	22.46	0.37358
67	7	21	24.41	0.27359
68	7	21	23.63	0.31145
69	7	21	16.83	0.72127
70	7	21	12.76	0.91689
71	7	21	29.12	0.11118
72	7	21	13.39	0.89428
73	7	21	19.98	0.52241
74	7	21	25.61	0.22156
75	7	21	24.19	0.28380
76	7	21	20.58	0.48464
77	7	21	20.36	0.49858
78	7	21	22.93	0.34755

79	7	21	27.05	0.16931
80	7	21	38.02	0.01281
81	7	21	14.76	0.83458
82	7	21	24.49	0.27003
83	7	21	15.07	0.81952
84	7	21	16.60	0.73505
85	7	21	24.97	0.24836
86	7	21	35.22	0.02669
87	7	21	16.85	0.72040
88	7	21	30.32	0.08570
89	7	21	21.07	0.45476
90	7	21	24.37	0.27538
91	7	21	28.88	0.11695
92	7	21	11.17	0.95936
93	7	21	16.15	0.76100
94	7	21	20.65	0.48070
95	7	21	15.73	0.78460
96	7	21	26.58	0.18530
97	7	21	31.05	0.07275
98	7	21	11.87	0.94295
99	7	21	15.52	0.79614
100	7	21	12.89	0.91240
Combined P-value for all tests (Using KS method)				0.95138

Notes:

- 1) The P-values are observed probabilities from the Chi-Square tests. The last row shows the result of the KS Test performed on the p-values for all Chi-Square tests, where there are sufficient data.

4. Summary of the analysis

4.1 Summary of the analysis of 52 cards deck:

The analysis of 52 cards completes by combining the result of the KS Test performed in the 3 types of analysis (Hand Types, Ranks and Suits) for 52 card decks using the Holm's method and producing a single Combined P -value.

The combined p-value produced using the Holm's method is used as indication for statistical randomness.

Combination of p-values using Holm's Method		
Test	P-Value	P-Adjusted
Ranks Test	0.93654	1.00000
Suits Test	0.95138	1.00000
Hand Types Test	0.45701	1.00000
Combined P-Value using Holm's Method		1.00000

Notes:

- 1) The combined p-value of all statistical tests using Holm's Method conducted for 52 card decks is greater than the minimum value of 0.05 which indicates that the randomness of the observed data falls within 95% confidence limits.

The final outcome of the analysis of 52 cards deck indicates that the RNG is working correctly.

4. Conclusion

Analysis of actual data from game logs for 'Hand Types', 'Ranks' and 'Suits' for **52-card decks** indicated statistical randomness. Since there is no data in the case of 36 card deck, this report does not contain the details of 36 card deck.

iTech Labs has done limited sanity checks to verify the integrity of the game logs. iTech Labs also maintains a copy of the game logs for verification purposes. There were a large enough number of game records to give the calculations sufficient statistical power.

We conclude that the Random Number Generator (RNG) is working correctly.

Please click [here](#) to see the [Original](#) report.

Signed:



Alvin Rizaldi
Chief Executive Officer
iTech Labs

Date: 20 May 2025

Signed:



Divya Bhargava
Project Manager
iTech Labs

Date: 20 May 2025

Disclaimer.

While it is not possible to test all possible scenarios in a laboratory environment, iTech Labs has conducted a level of testing appropriate for a component test of this type.

