

Poker Cards Analysis - March 2020

The Directors

GVC Plc

This is to confirm that iTech Labs has examined the game logs for Poker games for the period **March 01, 2020** to **March 31, 2020** as recorded by the respective game servers and analyzed the Poker cards for statistical randomness. The results of the analysis are given below.

URLs: <https://www.bwin.be/>, <https://www.bwin.dk/>, <https://www.bwin.es/>, <https://www.bwin.fr/>, <https://www.bwin.it/>, <https://www.premiumbull.com/>, <https://www.bwin.gr/>, <https://www.bwin.com/>, <https://www.partypoker.cz/>, <https://da.partypoker.com/>, <https://danskspil.dk/>, <https://www.partypoker.fr/>, <https://www.giocodigitale.it/>, <https://www.br.betboo.com/en/>, <https://www.partypremium.com/>, <https://www.partypoker.es/en/>, <https://www.partypoker.com/>, <https://sports.premium.com/en/sports/>, <https://poker.partypoker.se/sv/poker/>, <https://sports.sportingbet.com/en/sports/>, <https://sports.sportingbet.gr/el/sports/>, <https://www.sh.bwin.de/>, <https://sports.vistabet.com/el/sports/>, <https://sports.sportingbet.co.za/en/sports/>

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	11.44	0.24684
2	9	9.18	0.42119
3	9	6.37	0.70264
4	9	9.91	0.35782
5	9	18.52	0.02955
6	9	14.97	0.09190
7	9	4.02	0.90979
8	9	8.16	0.51834
9	9	11.03	0.27353
10	9	5.47	0.79176
11	9	5.90	0.74959
12	9	5.13	0.82293
13	9	3.99	0.91177
14	9	16.56	0.05613
15	9	5.48	0.79064
16	9	8.44	0.49034
17	9	7.53	0.58180
18	9	13.45	0.14342
19	9	4.27	0.89245
20	9	13.22	0.15305
21	9	3.73	0.92828

22	9	2.55	0.97946
23	9	11.56	0.23914
24	9	8.67	0.46856
25	9	7.47	0.58856
26	9	9.98	0.35191
27	9	15.47	0.07880
28	9	4.87	0.84538
29	9	10.27	0.32876
30	9	8.41	0.49389
31	9	6.51	0.68819
32	9	10.07	0.34468
33	9	9.07	0.43092
34	9	9.42	0.39957
35	9	8.29	0.50542
36	9	9.53	0.38996
37	9	13.41	0.14505
38	9	8.02	0.53207
39	9	8.75	0.46031
40	9	8.09	0.52551
41	9	9.28	0.41142
42	9	7.97	0.53718
43	9	8.37	0.49746
44	9	9.68	0.37698
45	9	4.15	0.90160
46	9	8.41	0.49312
47	9	4.82	0.85006
48	9	7.43	0.59240
49	9	7.71	0.56339
50	9	5.89	0.75056
51	9	7.13	0.62321
52	9	12.64	0.17954
53	9	8.90	0.44688
54	9	2.03	0.99100
55	9	5.03	0.83168
56	9	8.66	0.46955
57	9	5.29	0.80877
58	9	10.86	0.28514
59	9	12.75	0.17408
60	9	4.45	0.87966
61	9	9.87	0.36074
62	9	3.70	0.92992
63	9	13.19	0.15410
64	9	5.52	0.78670
65	9	10.32	0.32491
66	9	6.76	0.66201
67	9	9.54	0.38926
68	9	4.59	0.86851
69	9	10.81	0.28866
70	9	2.69	0.97529
71	9	5.61	0.77810
72	9	7.06	0.63117
73	9	12.46	0.18853
74	9	4.31	0.88967
75	9	5.81	0.75848
76	9	15.59	0.07597

77	9	4.86	0.84630
78	9	4.99	0.83489
79	9	13.52	0.14049
80	9	16.71	0.05344
81	9	6.67	0.67166
82	9	3.55	0.93849
83	9	4.99	0.83560
84	9	8.25	0.50881
85	9	7.44	0.59118
86	9	10.77	0.29189
87	9	8.12	0.52168
88	9	9.35	0.40583
89	9	5.74	0.76528
90	9	9.62	0.38186
91	9	6.54	0.68501
92	9	11.94	0.21653
93	9	15.26	0.08401
94	9	8.04	0.53012
95	9	5.04	0.83073
96	9	12.15	0.20509
97	9	8.37	0.49726
98	9	5.27	0.80985
99	9	11.99	0.21407
100	9	5.07	0.82781
Combined P-value for all tests (Using KS method)			0.44986

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.

1.2 Poker hand types statistics for 36 cards deck:

Test No.	DOF	ChiSqr	P-Value
1	9	14.46	0.10699
2	9	5.81	0.75847
3	9	6.98	0.63901
4	9	2.60	0.97802
5	9	3.42	0.94533
6	9	12.53	0.18512
7	9	8.25	0.50963
8	9	10.42	0.31773
9	9	9.78	0.36840
10	9	11.66	0.23330
11	9	7.96	0.53863
12	9	9.85	0.36237
13	9	7.03	0.63444
14	9	14.12	0.11797
15	9	5.25	0.81208
16	9	8.53	0.48133
17	9	14.32	0.11126
18	9	10.15	0.33843
19	9	21.78	0.00961
20	9	16.89	0.05055
21	9	9.47	0.39488

Combined P-value for all tests (Using KS method)	0.85162
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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 and 9 ranks (6, 7, 8, 9, 10, J, Q, K, A) for a 36 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.	Positions	DOF	ChiSqr	P-Value
1	7	84	82.40	0.52908
2	7	84	73.47	0.78735
3	7	84	85.15	0.44445
4	7	84	85.21	0.44258
5	7	84	82.87	0.51425
6	7	84	85.09	0.44627
7	7	84	87.28	0.38173
8	7	84	81.66	0.55196
9	7	84	65.97	0.92691
10	7	84	84.50	0.46406
11	7	84	100.84	0.10165
12	7	84	72.60	0.80815
13	7	84	91.57	0.26808
14	7	84	87.66	0.37069
15	7	84	86.40	0.40734
16	7	84	77.04	0.69175
17	7	84	84.48	0.46492
18	7	84	87.86	0.36522
19	7	84	89.25	0.32702
20	7	84	79.77	0.61026
21	7	84	101.81	0.09048
22	7	84	87.52	0.37479
23	7	84	87.88	0.36471
24	7	84	86.15	0.41443
25	7	84	88.29	0.35309
26	7	84	93.10	0.23303
27	7	84	88.25	0.35426
28	7	84	104.15	0.06739
29	7	84	81.93	0.54358
30	7	84	83.13	0.50631
31	7	84	80.49	0.58839
32	7	84	100.79	0.10236
33	7	84	95.06	0.19223
34	7	84	75.68	0.72985
35	7	84	88.20	0.35572
36	7	84	88.39	0.35053

37	7	84	97.46	0.14945
38	7	84	81.46	0.55830
39	7	84	90.00	0.30718
40	7	84	78.30	0.65479
41	7	84	73.17	0.79454
42	7	84	87.16	0.38518
43	7	84	79.78	0.61004
44	7	84	77.00	0.69294
45	7	84	74.63	0.75790
46	7	84	70.02	0.86277
47	7	84	78.48	0.64938
48	7	84	96.74	0.16165
49	7	84	72.74	0.80474
50	7	84	81.16	0.56762
51	7	84	114.21	0.01583
52	7	84	81.40	0.55997
53	7	84	88.44	0.34907
54	7	84	87.95	0.36268
55	7	84	67.27	0.90913
56	7	84	105.40	0.05718
57	7	84	94.49	0.20363
58	7	84	70.08	0.86167
59	7	84	76.75	0.69989
60	7	84	76.79	0.69888
61	7	84	75.54	0.73367
62	7	84	77.67	0.67341
63	7	84	69.94	0.86421
64	7	84	72.36	0.81354
65	7	84	63.46	0.95387
66	7	84	83.72	0.48812
67	7	84	89.84	0.31138
68	7	84	98.36	0.13543
69	7	84	86.66	0.39965
70	7	84	97.13	0.15501
71	7	84	71.96	0.82258
72	7	84	77.52	0.67784
73	7	84	97.87	0.14297
74	7	84	90.89	0.28468
75	7	84	86.89	0.39291
76	7	84	70.46	0.85413
77	7	84	66.56	0.91917
78	7	84	90.08	0.30528
79	7	84	69.48	0.87286
80	7	84	95.18	0.19008
81	7	84	73.69	0.78185
82	7	84	73.54	0.78560
83	7	84	105.85	0.05386
84	7	84	82.68	0.52020
85	7	84	80.80	0.57879
86	7	84	73.55	0.78528
87	7	84	80.30	0.59396
88	7	84	86.14	0.41479
89	7	84	83.16	0.50538
90	7	84	66.76	0.91637
91	7	84	86.95	0.39117

92	7	84	100.11	0.11084
93	7	84	75.52	0.73416
94	7	84	96.31	0.16912
95	7	84	63.08	0.95723
96	7	84	96.38	0.16783
97	7	84	79.83	0.60852
98	7	84	77.82	0.66914
99	7	84	100.94	0.10049
100	7	84	77.95	0.66524
Combined P-value for all tests (Using KS method)				0.38940

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.

2.2 Poker rank statistics for 36 cards deck:

Test No.	Positions	DOF	ChiSqr	P-Value
1	7	56	55.74	0.48460
2	7	56	59.54	0.34825
3	7	56	59.14	0.36176
4	7	56	58.00	0.40160
5	7	56	62.55	0.25505
6	7	56	58.84	0.37202
7	7	56	79.93	0.01957
8	7	56	59.19	0.35980
9	7	56	39.94	0.94826
10	7	56	46.45	0.81484
11	7	56	59.06	0.36422
12	7	56	37.90	0.96956
13	7	56	63.54	0.22811
14	7	56	60.38	0.32059
15	7	56	38.23	0.96672
16	7	56	64.96	0.19280
17	7	56	56.68	0.44930
18	7	56	56.30	0.46350
19	7	56	55.94	0.47714
20	7	56	65.08	0.18994
21	7	56	56.89	0.44158
22	7	56	68.31	0.12527
23	7	56	56.72	0.44797
24	7	56	47.34	0.78830
25	7	56	51.97	0.62804
26	7	56	50.19	0.69355
27	7	56	42.43	0.90968
28	7	56	61.37	0.28952
29	7	56	45.31	0.84591
30	7	56	45.26	0.84703
31	7	56	59.08	0.36360
32	7	56	52.44	0.61054
33	7	56	54.32	0.53858
34	7	56	35.34	0.98600
35	7	56	46.91	0.80121
36	7	56	58.48	0.38429
37	7	56	66.14	0.16651
38	7	56	37.01	0.97645

39	7	56	58.03	0.40019
40	7	56	47.33	0.78863
41	7	56	55.93	0.47754
42	7	56	36.39	0.98046
43	7	56	52.00	0.62682
44	7	56	44.16	0.87385
45	7	56	33.32	0.99312
46	7	56	50.65	0.67672
47	7	56	51.82	0.63384
48	7	56	55.83	0.48120
49	7	56	57.75	0.41024
50	7	56	68.93	0.11492
51	7	56	78.76	0.02415
52	7	56	68.12	0.12849
53	7	56	62.25	0.26365
54	7	56	45.70	0.83539
55	7	56	48.10	0.76469
56	7	56	56.32	0.46269
57	7	56	45.88	0.83053
58	7	56	46.23	0.82086
59	7	56	63.52	0.22868
60	7	56	48.75	0.74321
61	7	56	32.57	0.99484
62	7	56	59.22	0.35906
63	7	56	83.12	0.01080
64	7	56	54.06	0.54877
65	7	56	71.83	0.07546
66	7	56	42.64	0.90582
67	7	56	60.74	0.30902
68	7	56	46.04	0.82638
69	7	56	47.51	0.78321
70	7	56	40.93	0.93476
71	7	56	47.72	0.77670
72	7	56	60.48	0.31747
73	7	56	60.99	0.30113
74	7	56	51.94	0.62939
75	7	56	46.54	0.81216
76	7	56	48.95	0.73645
77	7	56	53.96	0.55263
78	7	56	46.73	0.80651
79	7	56	52.06	0.62466
80	7	56	51.83	0.63330
81	7	56	51.85	0.63276
82	7	56	62.65	0.25211
83	7	56	55.92	0.47795
84	7	56	54.97	0.51369
85	7	56	68.71	0.11853
86	7	56	48.90	0.73815
87	7	56	52.94	0.59127
88	7	56	46.89	0.80206
89	7	56	47.47	0.78432
90	7	56	54.22	0.54243
91	7	56	54.64	0.52660
92	7	56	69.09	0.11247
93	7	56	44.35	0.86942

94	7	56	51.99	0.62723
95	7	56	59.02	0.36557
96	7	56	40.51	0.94080
97	7	56	44.09	0.87541
98	7	56	50.64	0.67724
99	7	56	70.50	0.09193
100	7	56	62.13	0.26707
Combined P-value for all tests (Using KS method)				0.17393

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 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	29.93	0.09334
2	7	21	12.83	0.91455
3	7	21	25.36	0.23175
4	7	21	12.78	0.91599
5	7	21	25.06	0.24474
6	7	21	20.65	0.48032
7	7	21	22.14	0.39133
8	7	21	25.56	0.22363
9	7	21	25.48	0.22715
10	7	21	19.05	0.58187
11	7	21	30.93	0.07475
12	7	21	17.99	0.64991
13	7	21	27.56	0.15301
14	7	21	19.70	0.54044
15	7	21	10.23	0.97575
16	7	21	24.57	0.26625
17	7	21	23.64	0.31107
18	7	21	23.94	0.29616
19	7	21	21.73	0.41500
20	7	21	17.30	0.69269
21	7	21	12.63	0.92113
22	7	21	13.75	0.87998
23	7	21	22.04	0.39715
24	7	21	25.96	0.20785
25	7	21	23.04	0.34203
26	7	21	7.45	0.99706
27	7	21	21.61	0.42231
28	7	21	25.03	0.24592
29	7	21	17.77	0.66363
30	7	21	23.56	0.31489
31	7	21	21.18	0.44795
32	7	21	18.90	0.59165

33	7	21	10.04	0.97835
34	7	21	31.91	0.05973
35	7	21	24.46	0.27135
36	7	21	20.79	0.47193
37	7	21	18.82	0.59693
38	7	21	34.17	0.03475
39	7	21	28.53	0.12567
40	7	21	24.30	0.27854
41	7	21	21.37	0.43638
42	7	21	20.27	0.50409
43	7	21	21.05	0.45567
44	7	21	15.42	0.80128
45	7	21	9.67	0.98288
46	7	21	11.33	0.95599
47	7	21	27.60	0.15179
48	7	21	10.66	0.96896
49	7	21	16.09	0.76459
50	7	21	24.93	0.25023
51	7	21	33.22	0.04380
52	7	21	21.49	0.42966
53	7	21	29.04	0.11304
54	7	21	20.75	0.47431
55	7	21	22.46	0.37351
56	7	21	16.61	0.73431
57	7	21	12.35	0.92958
58	7	21	26.05	0.20457
59	7	21	22.51	0.37072
60	7	21	20.00	0.52132
61	7	21	23.53	0.31643
62	7	21	16.87	0.71881
63	7	21	25.88	0.21101
64	7	21	28.44	0.12801
65	7	21	10.08	0.97787
66	7	21	32.01	0.05835
67	7	21	21.27	0.44266
68	7	21	27.34	0.15996
69	7	21	22.24	0.38580
70	7	21	27.24	0.16312
71	7	21	19.51	0.55265
72	7	21	18.57	0.61243
73	7	21	28.98	0.11439
74	7	21	34.41	0.03272
75	7	21	16.91	0.71639
76	7	21	19.96	0.52353
77	7	21	26.71	0.18077
78	7	21	27.83	0.14505
79	7	21	30.76	0.07768
80	7	21	24.84	0.25430
81	7	21	25.14	0.24128
82	7	21	16.45	0.74409
83	7	21	9.96	0.97947
84	7	21	22.98	0.34507
85	7	21	16.78	0.72430
86	7	21	24.19	0.28410
87	7	21	12.84	0.91411

88	7	21	18.06	0.64509
89	7	21	27.50	0.15492
90	7	21	35.90	0.02244
91	7	21	23.00	0.34386
92	7	21	27.39	0.15827
93	7	21	20.22	0.50741
94	7	21	13.49	0.89065
95	7	21	26.10	0.20247
96	7	21	16.26	0.75485
97	7	21	22.04	0.39722
98	7	21	20.77	0.47304
99	7	21	20.51	0.48897
100	7	21	27.61	0.15145
Combined P-value for all tests (Using KS method)				0.04372

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.

3.2 Poker suits statistics for 36 cards deck:

Test No.	Positions	DOF	ChiSqr	P-Value
1	7	21	20.97	0.46051
2	7	21	28.50	0.12655
3	7	21	21.61	0.42201
4	7	21	22.68	0.36110
5	7	21	21.32	0.43984
6	7	21	12.46	0.92629
7	7	21	15.80	0.78069
8	7	21	20.74	0.47507
9	7	21	32.53	0.05168
10	7	21	24.44	0.27231
11	7	21	16.80	0.72335
12	7	21	14.98	0.82391
13	7	21	25.05	0.24509
14	7	21	14.53	0.84572
15	7	21	25.31	0.23410
16	7	21	14.65	0.83996
17	7	21	17.41	0.68590
18	7	21	25.39	0.23085
19	7	21	20.46	0.49226
20	7	21	22.58	0.36682
21	7	21	11.59	0.95002
22	7	21	13.09	0.90551
23	7	21	18.04	0.64678
24	7	21	16.98	0.71237
25	7	21	22.10	0.39400
26	7	21	25.52	0.22528
27	7	21	16.92	0.71594
28	7	21	28.99	0.11435
29	7	21	29.34	0.10613
30	7	21	35.71	0.02354
31	7	21	29.89	0.09420
32	7	21	22.48	0.37241
33	7	21	19.82	0.53284
34	7	21	20.31	0.50198

35	7	21	18.87	0.59366
36	7	21	27.56	0.15293
37	7	21	18.76	0.60043
38	7	21	10.42	0.97299
39	7	21	17.69	0.66835
40	7	21	17.52	0.67885
41	7	21	20.78	0.47269
42	7	21	20.80	0.47122
43	7	21	24.62	0.26382
44	7	21	29.57	0.10088
45	7	21	12.29	0.93156
46	7	21	15.12	0.81672
47	7	21	28.05	0.13884
48	7	21	18.50	0.61713
49	7	21	14.47	0.84848
50	7	21	31.99	0.05868
51	7	21	12.87	0.91310
52	7	21	18.92	0.59058
53	7	21	21.59	0.42324
54	7	21	29.21	0.10913
55	7	21	11.66	0.94829
56	7	21	11.60	0.94987
57	7	21	23.17	0.33509
58	7	21	27.60	0.15201
59	7	21	28.32	0.13144
60	7	21	20.80	0.47112
61	7	21	10.56	0.97069
62	7	21	16.34	0.75030
63	7	21	28.92	0.11582
64	7	21	10.45	0.97251
65	7	21	17.38	0.68798
66	7	21	17.87	0.65709
67	7	21	29.35	0.10577
68	7	21	12.86	0.91348
69	7	21	11.81	0.94457
70	7	21	16.65	0.73231
71	7	21	17.40	0.68659
72	7	21	16.92	0.71623
73	7	21	18.87	0.59345
74	7	21	16.71	0.72860
75	7	21	33.56	0.04040
76	7	21	23.35	0.32558
77	7	21	38.74	0.01055
78	7	21	14.84	0.83066
79	7	21	18.36	0.62612
80	7	21	43.24	0.00293
81	7	21	23.45	0.32032
82	7	21	22.96	0.34629
83	7	21	33.69	0.03908
84	7	21	20.60	0.48359
85	7	21	27.85	0.14456
86	7	21	21.24	0.44466
87	7	21	34.66	0.03075
88	7	21	18.55	0.61375
89	7	21	22.86	0.35127

90	7	21	19.16	0.57457
91	7	21	21.27	0.44264
92	7	21	21.70	0.41683
93	7	21	33.61	0.03985
94	7	21	26.34	0.19363
95	7	21	21.01	0.45826
96	7	21	14.80	0.83285
97	7	21	36.18	0.02085
98	7	21	27.25	0.16264
99	7	21	11.66	0.94840
100	7	21	20.67	0.47935
Combined P-value for all tests (Using KS method)				0.74028

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	0.38940	0.77881
Suits Test	0.04372	0.13115
Hand Types Test	0.44986	0.77881
Combined P-Value using Holm's Method		0.13115

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.

4.2 Summary of the analysis of 36 cards deck:

The analysis of 36 cards completes by combining the result of the KS Test performed in the 3 types of analysis (Hand Types, Ranks and Suits) for 36 card decks using the Holm's method and producing a single Combined P -value. Where there are insufficient data the individual Chi-Square tests results are used in the Holm's method for producing a combined p-value.

The combined p-value produced from the 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	0.17393	0.52179
Suits Test	0.74028	1.00000
Hands Type Test	0.85162	1.00000

Combined P-Value using Holm's Method	0.52179
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Notes:

- 1) The combined p-value of all statistical tests using Holm's Method conducted for 36 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 36 cards deck indicates that the RNG is working correctly.

5. Conclusion

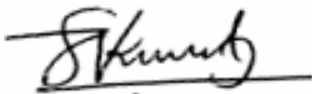
Analysis of actual data from game logs for 'Hand Types', 'Ranks' and 'Suits' for **52-card decks** and **36-card decks** indicated statistical randomness.

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:



Kiren Sreekumar
Principal Consultant
iTech Labs Australia
Date: 30 April, 2020

Signed:



Geoff Nicoll
Principal Consultant
iTech Labs Australia
Date: 30 April, 2020

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.