



Poker Cards Analysis - October 2019

The Directors

GVC Plc

This is to confirm that iTech Labs has examined the game logs for Poker games for the period **October 01, 2019 to October 31, 2019** 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	20.76	0.01375
2	9	8.45	0.48963
3	9	16.60	0.05533
4	9	8.53	0.48168
5	9	5.56	0.78313
6	9	12.69	0.17732
7	9	12.44	0.18968
8	9	6.64	0.67494
9	9	6.85	0.65234
10	9	12.23	0.20059
11	9	11.18	0.26341
12	9	11.04	0.27277
13	9	10.66	0.29984
14	9	5.60	0.77923
15	9	8.50	0.48428
16	9	14.51	0.10540
17	9	8.65	0.47041
18	9	11.43	0.24735
19	9	9.81	0.36569
20	9	8.15	0.51956
21	9	8.20	0.51419

22	9	8.28	0.50643
23	9	7.07	0.62973
24	9	14.92	0.09327
25	9	15.15	0.08700
26	9	5.29	0.80830
27	9	7.25	0.61106
28	9	6.58	0.68031
29	9	8.09	0.52517
30	9	14.58	0.10309
31	9	10.70	0.29667
32	9	5.22	0.81435
33	9	3.91	0.91698
34	9	12.48	0.18754
35	9	10.16	0.33742
36	9	13.71	0.13292
37	9	10.46	0.31420
38	9	5.84	0.75587
39	9	12.38	0.19296
40	9	3.22	0.95483
41	9	4.48	0.87723
42	9	10.54	0.30827
43	9	2.81	0.97124
44	9	4.45	0.87938
45	9	19.78	0.01931
46	9	2.57	0.97888
47	9	9.90	0.35843
48	9	7.33	0.60317
49	9	13.19	0.15415
50	9	10.76	0.29266
51	9	14.46	0.10687
52	9	14.50	0.10571
53	9	3.85	0.92116
54	9	4.53	0.87285
55	9	9.59	0.38445
56	9	6.33	0.70646
57	9	5.26	0.81073
58	9	10.81	0.28899
59	9	5.37	0.80067
60	9	17.81	0.03741
61	9	9.43	0.39831
62	9	6.02	0.73777
63	9	8.10	0.52404
64	9	8.34	0.50076
65	9	11.96	0.21540
66	9	18.77	0.02720
67	9	12.98	0.16366
68	9	9.98	0.35242
69	9	11.24	0.25947
70	9	12.90	0.16706
71	9	2.97	0.96548
72	9	17.71	0.03871
73	9	13.88	0.12654
74	9	6.55	0.68352
75	9	5.60	0.77955
76	9	6.03	0.73720

77	9	2.46	0.98182
78	9	6.34	0.70553
79	9	5.76	0.76368
80	9	7.49	0.58604
81	9	11.21	0.26138
82	9	4.96	0.83782
83	9	8.25	0.50869
84	9	16.58	0.05570
85	9	7.15	0.62165
86	9	8.32	0.50212
87	9	7.49	0.58576
88	9	12.83	0.17047
89	9	6.66	0.67283
90	9	5.41	0.79765
91	9	5.92	0.74812
92	9	11.42	0.24806
93	9	5.98	0.74169
94	9	13.84	0.12831
95	9	11.89	0.21963
96	9	12.31	0.19626
97	9	14.65	0.10093
98	9	5.72	0.76726
99	9	16.07	0.06550
100	9	12.61	0.18106
Combined P-value for all tests (Using KS method)			0.20080

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	13.56	0.13871
2	9	8.32	0.50234
3	9	5.10	0.82519
4	9	12.78	0.17291
5	9	13.96	0.12368
6	9	8.47	0.48780
7	9	4.06	0.90766
8	9	8.64	0.47109
9	9	7.47	0.58848
Combined P-value for all tests (Using KS method)			N/A (Insufficient data)

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	100.44	0.10657
2	7	84	86.29	0.41031
3	7	84	90.80	0.28693
4	7	84	80.42	0.59037
5	7	84	85.49	0.43428
6	7	84	80.74	0.58045
7	7	84	74.60	0.75867
8	7	84	85.68	0.42839
9	7	84	93.52	0.22378
10	7	84	106.10	0.05202
11	7	84	77.01	0.69254
12	7	84	85.32	0.43944
13	7	84	93.74	0.21911
14	7	84	70.40	0.85537
15	7	84	77.42	0.68066
16	7	84	107.79	0.04125
17	7	84	90.96	0.28301
18	7	84	81.35	0.56170
19	7	84	86.50	0.40417
20	7	84	84.65	0.45956
21	7	84	76.44	0.70883
22	7	84	85.62	0.43040
23	7	84	62.52	0.96176
24	7	84	88.90	0.33655
25	7	84	92.16	0.25418
26	7	84	91.36	0.27312
27	7	84	88.93	0.33558
28	7	84	89.25	0.32715
29	7	84	64.24	0.94643
30	7	84	89.37	0.32385
31	7	84	70.78	0.84769
32	7	84	98.34	0.13578
33	7	84	76.93	0.69491
34	7	84	83.89	0.48277
35	7	84	100.16	0.11027
36	7	84	90.90	0.28455
37	7	84	93.41	0.22611
38	7	84	92.56	0.24491
39	7	84	85.78	0.42559
40	7	84	84.58	0.46159
41	7	84	66.97	0.91347
42	7	84	95.24	0.18885
43	7	84	92.58	0.24450
44	7	84	90.46	0.29561
45	7	84	68.02	0.89766
46	7	84	95.44	0.18499

47	7	84	57.37	0.98842
48	7	84	63.87	0.95010
49	7	84	78.28	0.65553
50	7	84	86.79	0.39590
51	7	84	68.50	0.88995
52	7	84	113.41	0.01796
53	7	84	80.21	0.59697
54	7	84	89.45	0.32158
55	7	84	88.10	0.35851
56	7	84	71.68	0.82876
57	7	84	96.39	0.16774
58	7	84	82.15	0.53676
59	7	84	79.40	0.62166
60	7	84	95.75	0.17924
61	7	84	80.03	0.60235
62	7	84	67.87	0.90004
63	7	84	95.01	0.19324
64	7	84	80.08	0.60072
65	7	84	92.78	0.23995
66	7	84	91.78	0.26310
67	7	84	93.44	0.22552
68	7	84	92.04	0.25710
69	7	84	72.25	0.81620
70	7	84	99.90	0.11359
71	7	84	64.26	0.94626
72	7	84	92.08	0.25612
73	7	84	68.55	0.88916
74	7	84	82.39	0.52919
75	7	84	98.26	0.13697
76	7	84	86.06	0.41711
77	7	84	101.02	0.09956
78	7	84	93.61	0.22190
79	7	84	75.66	0.73039
80	7	84	70.49	0.85354
81	7	84	88.18	0.35630
82	7	84	85.38	0.43761
83	7	84	91.55	0.26862
84	7	84	79.91	0.60600
85	7	84	81.05	0.57105
86	7	84	67.72	0.90245
87	7	84	79.12	0.63026
88	7	84	76.09	0.71869
89	7	84	74.91	0.75071
90	7	84	80.57	0.58576
91	7	84	77.82	0.66894
92	7	84	97.09	0.15555
93	7	84	82.87	0.51442
94	7	84	92.16	0.25423
95	7	84	60.85	0.97319
96	7	84	70.77	0.84790
97	7	84	85.28	0.44053
98	7	84	66.35	0.92196
99	7	84	94.93	0.19489
100	7	84	81.08	0.57000

Combined P-value for all tests (Using KS method)	0.53583
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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.

2.2 Poker rank statistics for 36 cards deck:

Test No.	Positions	DOF	ChiSqr	P-Value
1	7	56	61.63	0.28183
2	7	56	50.11	0.69639
3	7	56	56.16	0.46871
4	7	56	57.71	0.41175
5	7	56	35.04	0.98732
6	7	56	43.20	0.89481
7	7	56	61.21	0.29437
8	7	56	59.39	0.35329
9	7	56	61.41	0.28834
10	7	56	75.72	0.04073
11	7	56	52.38	0.61254
12	7	56	66.51	0.15897
13	7	56	50.64	0.67733
14	7	56	58.99	0.36677
15	7	56	81.29	0.01525
16	7	56	58.28	0.39153
17	7	56	55.10	0.50885
18	7	56	45.39	0.84369
19	7	56	57.45	0.42119
20	7	56	58.74	0.37547
21	7	56	67.13	0.14666
22	7	56	39.39	0.95488
23	7	56	37.15	0.97547
24	7	56	55.30	0.50132
25	7	56	58.68	0.37765
26	7	56	51.79	0.63487
27	7	56	56.52	0.45560
28	7	56	62.58	0.25415
29	7	56	65.86	0.17260
30	7	56	65.76	0.17476
31	7	56	63.63	0.22587
32	7	56	51.39	0.64961
33	7	56	91.81	0.00180
34	7	56	55.93	0.47750
35	7	56	56.75	0.44692
36	7	56	49.32	0.72378
37	7	56	53.99	0.55148
38	7	56	60.47	0.31778
39	7	56	69.73	0.10277
40	7	56	51.73	0.63723
41	7	56	56.68	0.44959
42	7	56	80.44	0.01786
43	7	56	52.70	0.60060
44	7	56	58.48	0.38457
45	7	56	42.77	0.90324
46	7	56	63.54	0.22822
47	7	56	45.60	0.83824
48	7	56	62.68	0.25138

49	7	56	79.69	0.02046
50	7	56	46.67	0.80842
51	7	56	59.01	0.36615
52	7	56	54.89	0.51708
53	7	56	60.49	0.31692
54	7	56	54.07	0.54838
55	7	56	47.85	0.77258
56	7	56	52.10	0.62340
57	7	56	53.71	0.56215
58	7	56	48.51	0.75106
59	7	56	71.66	0.07743
60	7	56	57.20	0.43037
61	7	56	56.54	0.45460
62	7	56	49.97	0.70118
63	7	56	52.02	0.62610
64	7	56	55.97	0.47614
65	7	56	51.03	0.66322
66	7	56	46.28	0.81951
67	7	56	63.85	0.22005
68	7	56	38.33	0.96582
69	7	56	61.33	0.29080
70	7	56	61.98	0.27145
71	7	56	59.13	0.36215
72	7	56	56.75	0.44674
73	7	56	61.53	0.28474
74	7	56	63.16	0.23831
75	7	56	44.54	0.86500
76	7	56	63.51	0.22888
77	7	56	48.51	0.75119
78	7	56	53.54	0.56862
79	7	56	72.43	0.06895
80	7	56	76.25	0.03725
81	7	56	68.26	0.12612
82	7	56	60.13	0.32856
83	7	56	53.90	0.55485
84	7	56	54.10	0.54704
85	7	56	34.71	0.98867
86	7	56	44.33	0.86997
87	7	56	61.67	0.28061
88	7	56	54.73	0.52318
89	7	56	52.12	0.62242
90	7	56	55.69	0.48647
91	7	56	77.07	0.03244
92	7	56	61.56	0.28384
93	7	56	55.41	0.49715
94	7	56	48.62	0.74762
95	7	56	57.35	0.42493
96	7	56	53.60	0.56609
97	7	56	46.82	0.80388
98	7	56	46.03	0.82649
99	7	56	52.58	0.60519
100	7	56	63.50	0.22918
Combined P-value for all tests (Using KS method)				0.22843

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	14.92	0.82704
2	7	21	16.13	0.76202
3	7	21	12.19	0.93421
4	7	21	27.55	0.15327
5	7	21	30.83	0.07649
6	7	21	30.60	0.08051
7	7	21	17.30	0.69255
8	7	21	17.15	0.70203
9	7	21	11.13	0.96013
10	7	21	15.93	0.77365
11	7	21	14.57	0.84408
12	7	21	20.73	0.47559
13	7	21	19.22	0.57104
14	7	21	24.58	0.26579
15	7	21	20.02	0.52027
16	7	21	16.27	0.75439
17	7	21	20.82	0.47000
18	7	21	9.97	0.97933
19	7	21	18.88	0.59291
20	7	21	31.54	0.06513
21	7	21	25.74	0.21653
22	7	21	11.07	0.96150
23	7	21	23.06	0.34103
24	7	21	15.49	0.79767
25	7	21	25.49	0.22640
26	7	21	21.80	0.41082
27	7	21	20.99	0.45942
28	7	21	28.70	0.12130
29	7	21	21.78	0.41208
30	7	21	23.87	0.29920
31	7	21	16.84	0.72048
32	7	21	21.40	0.43455
33	7	21	21.43	0.43301
34	7	21	12.15	0.93538
35	7	21	18.06	0.64522
36	7	21	14.59	0.84284
37	7	21	21.04	0.45667
38	7	21	17.23	0.69717
39	7	21	21.76	0.41372
40	7	21	36.05	0.02160
41	7	21	26.62	0.18384
42	7	21	13.25	0.89958

43	7	21	17.47	0.68222
44	7	21	17.70	0.66817
45	7	21	21.53	0.42681
46	7	21	13.42	0.89321
47	7	21	17.95	0.65235
48	7	21	24.19	0.28395
49	7	21	15.30	0.80777
50	7	21	18.98	0.58657
51	7	21	29.05	0.11272
52	7	21	13.77	0.87940
53	7	21	28.97	0.11472
54	7	21	17.51	0.68002
55	7	21	19.00	0.58511
56	7	21	32.31	0.05441
57	7	21	14.65	0.83998
58	7	21	27.71	0.14867
59	7	21	39.94	0.00756
60	7	21	20.35	0.49891
61	7	21	29.58	0.10082
62	7	21	19.42	0.55852
63	7	21	21.80	0.41119
64	7	21	13.90	0.87368
65	7	21	24.08	0.28911
66	7	21	15.82	0.77974
67	7	21	26.08	0.20360
68	7	21	16.97	0.71303
69	7	21	20.85	0.46797
70	7	21	7.99	0.99519
71	7	21	14.57	0.84372
72	7	21	16.04	0.76765
73	7	21	19.14	0.57634
74	7	21	20.12	0.51358
75	7	21	14.02	0.86877
76	7	21	18.82	0.59666
77	7	21	21.30	0.44083
78	7	21	9.09	0.98848
79	7	21	15.90	0.77523
80	7	21	28.49	0.12670
81	7	21	25.88	0.21118
82	7	21	18.14	0.63997
83	7	21	30.80	0.07701
84	7	21	18.52	0.61621
85	7	21	15.99	0.77032
86	7	21	29.70	0.09826
87	7	21	18.10	0.64268
88	7	21	18.85	0.59467
89	7	21	20.43	0.49392
90	7	21	18.97	0.58720
91	7	21	24.80	0.25606
92	7	21	25.08	0.24386
93	7	21	15.63	0.78984
94	7	21	25.67	0.21917
95	7	21	33.46	0.04137
96	7	21	15.88	0.77642
97	7	21	19.01	0.58458

98	7	21	19.21	0.57181
99	7	21	17.52	0.67885
100	7	21	19.78	0.53494
Combined P-value for all tests (Using KS method)				0.09990

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	19.07	0.58078
2	7	21	18.68	0.60540
3	7	21	23.14	0.33656
4	7	21	21.30	0.44100
5	7	21	32.87	0.04770
6	7	21	14.12	0.86439
7	7	21	14.14	0.86351
8	7	21	8.39	0.99325
9	7	21	27.84	0.14486
10	7	21	26.48	0.18873
11	7	21	10.09	0.97775
12	7	21	23.85	0.30028
13	7	21	25.10	0.24286
14	7	21	19.46	0.55566
15	7	21	22.44	0.37432
16	7	21	30.06	0.09087
17	7	21	14.26	0.85817
18	7	21	15.94	0.77279
19	7	21	25.72	0.21749
20	7	21	24.90	0.25170
21	7	21	15.06	0.81993
22	7	21	14.59	0.84285
23	7	21	24.67	0.26183
24	7	21	19.42	0.55822
25	7	21	17.25	0.69597
26	7	21	12.50	0.92500
27	7	21	17.52	0.67939
28	7	21	18.33	0.62791
29	7	21	8.11	0.99465
30	7	21	11.70	0.94746
31	7	21	26.30	0.19509
32	7	21	31.16	0.07104
33	7	21	19.94	0.52506
34	7	21	28.30	0.13195
35	7	21	34.36	0.03312
36	7	21	16.69	0.72960
37	7	21	20.99	0.45968
38	7	21	25.38	0.23108
39	7	21	15.30	0.80781
40	7	21	17.85	0.65860
41	7	21	27.83	0.14510
42	7	21	27.04	0.16966
43	7	21	14.40	0.85200
44	7	21	22.28	0.38331

45	7	21	14.18	0.86192
46	7	21	18.62	0.60925
47	7	21	20.84	0.46900
48	7	21	12.84	0.91426
49	7	21	7.62	0.99657
50	7	21	16.40	0.74654
51	7	21	24.62	0.26382
52	7	21	20.74	0.47467
53	7	21	19.61	0.54620
54	7	21	15.75	0.78364
55	7	21	36.42	0.01963
56	7	21	18.78	0.59951
57	7	21	28.17	0.13545
58	7	21	13.54	0.88869
59	7	21	17.57	0.67590
60	7	21	24.46	0.27112
61	7	21	25.04	0.24561
62	7	21	26.66	0.18253
63	7	21	24.27	0.28026
64	7	21	19.17	0.57411
65	7	21	22.03	0.39790
66	7	21	11.10	0.96072
67	7	21	26.12	0.20191
68	7	21	21.54	0.42642
69	7	21	22.57	0.36744
70	7	21	27.66	0.15006
71	7	21	10.27	0.97516
72	7	21	26.15	0.20061
73	7	21	20.59	0.48442
74	7	21	33.66	0.03943
75	7	21	21.54	0.42618
76	7	21	18.41	0.62289
77	7	21	18.70	0.60463
78	7	21	18.54	0.61471
79	7	21	44.89	0.00179
80	7	21	25.80	0.21428
81	7	21	17.24	0.69662
82	7	21	20.62	0.48260
83	7	21	21.67	0.41862
84	7	21	15.74	0.78386
85	7	21	16.78	0.72427
86	7	21	31.07	0.07247
87	7	21	25.90	0.21024
88	7	21	21.83	0.40956
89	7	21	17.17	0.70071
90	7	21	12.13	0.93595
91	7	21	11.29	0.95682
92	7	21	13.00	0.90853
93	7	21	22.99	0.34441
94	7	21	11.33	0.95595
95	7	21	19.50	0.55318
96	7	21	10.06	0.97810
97	7	21	24.14	0.28639
98	7	21	26.13	0.20171
99	7	21	13.43	0.89295

100	7	21	18.61	0.61030
Combined P-value for all tests (Using KS method)				0.81218

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	0.53583	0.53583
Suits Test	0.09990	0.29970
Hand Types Test	0.20080	0.40160
Combined P-Value using Holm's Method		0.29970

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	0.22843	1.00000
Suits Test	0.81218	1.00000
Hands Type Test 1	0.13871	1.00000
Hands Type Test 2	0.50234	1.00000
Hands Type Test 3	0.82519	1.00000
Hands Type Test 4	0.17291	1.00000
Hands Type Test 5	0.12368	1.00000
Hands Type Test 6	0.48780	1.00000
Hands Type Test 7	0.90766	1.00000
Hands Type Test 8	0.47109	1.00000
Hands Type Test 9	0.58848	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 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: 25 November, 2019

Signed:



Geoff Nicoll
Principal Consultant
iTech Labs Australia
Date: 25 November, 2019

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.