



Poker Cards Analysis - December 2019

The Directors

GVC Plc

This is to confirm that iTech Labs has examined the game logs for Poker games for the period **December 01, 2019** to **December 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://danskespil.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	7.40	0.59579
2	9	7.33	0.60234
3	9	7.74	0.56051
4	9	3.73	0.92831
5	9	7.74	0.56082
6	9	19.33	0.02250
7	9	9.73	0.37264
8	9	6.63	0.67514
9	9	6.66	0.67223
10	9	5.55	0.78387
11	9	3.50	0.94115
12	9	5.40	0.79823
13	9	7.07	0.63033
14	9	6.50	0.68902
15	9	8.31	0.50309
16	9	9.46	0.39586
17	9	4.01	0.91053
18	9	11.89	0.21929
19	9	12.74	0.17462
20	9	3.53	0.93981
21	9	7.93	0.54117

22	9	17.52	0.04113
23	9	8.48	0.48706
24	9	11.09	0.26943
25	9	10.41	0.31851
26	9	11.69	0.23112
27	9	8.27	0.50708
28	9	2.88	0.96868
29	9	4.90	0.84312
30	9	7.08	0.62832
31	9	10.91	0.28206
32	9	16.40	0.05892
33	9	1.77	0.99464
34	9	8.33	0.50089
35	9	6.07	0.73327
36	9	4.06	0.90712
37	9	7.73	0.56169
38	9	16.75	0.05270
39	9	17.61	0.04000
40	9	5.90	0.74983
41	9	6.80	0.65799
42	9	2.47	0.98173
43	9	9.39	0.40193
44	9	18.03	0.03482
45	9	5.61	0.77813
46	9	11.84	0.22222
47	9	9.74	0.37234
48	9	9.73	0.37282
49	9	7.22	0.61436
50	9	10.02	0.34884
51	9	7.26	0.61016
52	9	16.62	0.05500
53	9	16.50	0.05706
54	9	6.49	0.69010
55	9	8.28	0.50660
56	9	9.88	0.36028
57	9	11.35	0.25229
58	9	14.19	0.11579
59	9	12.12	0.20662
60	9	4.09	0.90556
61	9	2.49	0.98122
62	9	2.13	0.98929
63	9	7.17	0.61910
64	9	7.95	0.53967
65	9	23.34	0.00548
66	9	12.88	0.16804
67	9	14.83	0.09573
68	9	14.38	0.10943
69	9	6.09	0.73039
70	9	5.43	0.79517
71	9	11.75	0.22789
72	9	18.12	0.03382
73	9	4.63	0.86516
74	9	4.85	0.84760
75	9	9.57	0.38662
76	9	16.12	0.06437

77	9	10.83	0.28756
78	9	8.76	0.45999
79	9	14.79	0.09683
80	9	18.07	0.03434
81	9	10.93	0.28035
82	9	5.73	0.76657
83	9	14.18	0.11595
84	9	22.29	0.00802
85	9	7.01	0.63568
86	9	4.02	0.91018
87	9	8.63	0.47233
88	9	9.98	0.35202
89	9	10.57	0.30614
90	9	0.97	0.99950
91	9	17.93	0.03600
92	9	3.53	0.93967
93	9	4.79	0.85231
94	9	10.67	0.29909
95	9	12.00	0.21357
96	9	4.89	0.84421
97	9	8.18	0.51567
98	9	23.57	0.00504
99	9	9.29	0.41134
100	9	5.18	0.81806
Combined P-value for all tests (Using KS method)			0.59999

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	5.91	0.74890
2	9	3.34	0.94946
3	9	7.58	0.57683
4	9	5.58	0.78129
5	9	8.01	0.53345
6	9	13.73	0.13235
7	9	13.85	0.12775
8	9	6.62	0.67707
9	9	6.21	0.71922
10	9	7.84	0.55054
11	9	9.11	0.42710
12	9	6.38	0.70144
13	9	11.77	0.22651
14	9	6.76	0.66176
15	9	9.69	0.37583
16	9	5.58	0.78066
17	9	6.46	0.69317
18	9	10.63	0.30225
19	9	5.28	0.80893
20	9	10.32	0.32515
21	9	8.29	0.50522
22	9	9.81	0.36601

Combined P-value for all tests (Using KS method)	0.54113
--	---------

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	79.10	0.63083
2	7	84	72.80	0.80328
3	7	84	102.17	0.08655
4	7	84	81.95	0.54296
5	7	84	86.04	0.41770
6	7	84	91.01	0.28182
7	7	84	89.14	0.32996
8	7	84	76.51	0.70683
9	7	84	77.44	0.68002
10	7	84	70.65	0.85032
11	7	84	64.26	0.94619
12	7	84	85.53	0.43300
13	7	84	79.95	0.60483
14	7	84	92.16	0.25429
15	7	84	76.19	0.71586
16	7	84	73.58	0.78461
17	7	84	84.48	0.46477
18	7	84	101.45	0.09453
19	7	84	85.92	0.42135
20	7	84	68.33	0.89270
21	7	84	84.24	0.47198
22	7	84	89.80	0.31263
23	7	84	78.42	0.65110
24	7	84	78.37	0.65261
25	7	84	82.25	0.53356
26	7	84	77.98	0.66434
27	7	84	76.59	0.70444
28	7	84	83.58	0.49239
29	7	84	67.95	0.89884
30	7	84	75.03	0.74753
31	7	84	93.81	0.21769
32	7	84	80.82	0.57796
33	7	84	124.21	0.00288

34	7	84	77.82	0.66899
35	7	84	80.95	0.57390
36	7	84	108.57	0.03695
37	7	84	79.73	0.61163
38	7	84	76.39	0.71024
39	7	84	113.78	0.01695
40	7	84	82.38	0.52949
41	7	84	76.37	0.71081
42	7	84	84.66	0.45922
43	7	84	57.33	0.98853
44	7	84	78.01	0.66340
45	7	84	106.46	0.04953
46	7	84	58.64	0.98402
47	7	84	74.61	0.75851
48	7	84	110.68	0.02719
49	7	84	113.02	0.01908
50	7	84	62.78	0.95970
51	7	84	80.17	0.59820
52	7	84	110.89	0.02633
53	7	84	66.92	0.91416
54	7	84	94.74	0.19856
55	7	84	77.68	0.67313
56	7	84	65.75	0.92955
57	7	84	78.48	0.64930
58	7	84	99.07	0.12499
59	7	84	98.12	0.13901
60	7	84	83.15	0.50557
61	7	84	94.32	0.20711
62	7	84	115.08	0.01379
63	7	84	97.56	0.14796
64	7	84	77.76	0.67076
65	7	84	74.88	0.75138
66	7	84	104.39	0.06526
67	7	84	89.57	0.31865
68	7	84	85.26	0.44116
69	7	84	76.21	0.71513
70	7	84	95.71	0.18006
71	7	84	79.01	0.63342
72	7	84	81.82	0.54705
73	7	84	66.27	0.92298
74	7	84	81.93	0.54369
75	7	84	78.51	0.64860
76	7	84	99.09	0.12477
77	7	84	94.87	0.19595
78	7	84	86.42	0.40668
79	7	84	88.10	0.35834
80	7	84	88.68	0.34242
81	7	84	77.14	0.68882
82	7	84	74.80	0.75340
83	7	84	75.64	0.73096
84	7	84	76.53	0.70636
85	7	84	100.29	0.10859
86	7	84	70.83	0.84680
87	7	84	105.13	0.05922
88	7	84	79.00	0.63373

89	7	84	89.13	0.33025
90	7	84	70.07	0.86179
91	7	84	92.05	0.25666
92	7	84	69.42	0.87398
93	7	84	70.46	0.85420
94	7	84	89.73	0.31447
95	7	84	86.48	0.40484
96	7	84	82.78	0.51719
97	7	84	111.30	0.02477
98	7	84	76.63	0.70333
99	7	84	97.86	0.14311
100	7	84	82.82	0.51594
Combined P-value for all tests (Using KS method)				0.67063

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	47.52	0.78287
2	7	56	46.32	0.81843
3	7	56	62.43	0.25851
4	7	56	50.67	0.67633
5	7	56	52.71	0.60017
6	7	56	41.41	0.92727
7	7	56	67.28	0.14380
8	7	56	65.64	0.17739
9	7	56	58.02	0.40083
10	7	56	58.06	0.39930
11	7	56	59.19	0.36004
12	7	56	68.99	0.11406
13	7	56	49.07	0.73255
14	7	56	49.29	0.72481
15	7	56	61.87	0.27455
16	7	56	73.36	0.05962
17	7	56	54.27	0.54078
18	7	56	61.45	0.28701
19	7	56	70.55	0.09131
20	7	56	51.24	0.65538
21	7	56	59.41	0.35248
22	7	56	41.27	0.92949
23	7	56	53.44	0.57232
24	7	56	54.92	0.51561
25	7	56	53.83	0.55731
26	7	56	57.08	0.43470
27	7	56	71.73	0.07670
28	7	56	75.52	0.04208
29	7	56	60.10	0.32944
30	7	56	53.34	0.57603
31	7	56	55.23	0.50383
32	7	56	48.83	0.74044
33	7	56	73.90	0.05477
34	7	56	42.88	0.90116
35	7	56	47.12	0.79497

36	7	56	59.32	0.35552
37	7	56	65.43	0.18197
38	7	56	53.36	0.57548
39	7	56	48.74	0.74345
40	7	56	69.74	0.10255
41	7	56	61.96	0.27201
42	7	56	48.75	0.74309
43	7	56	50.55	0.68063
44	7	56	69.29	0.10934
45	7	56	52.89	0.59319
46	7	56	52.61	0.60386
47	7	56	83.30	0.01042
48	7	56	51.25	0.65485
49	7	56	67.06	0.14787
50	7	56	32.80	0.99435
51	7	56	57.56	0.41712
52	7	56	56.87	0.44251
53	7	56	67.08	0.14759
54	7	56	51.09	0.66068
55	7	56	43.04	0.89794
56	7	56	58.03	0.40019
57	7	56	40.77	0.93703
58	7	56	67.45	0.14049
59	7	56	38.26	0.96646
60	7	56	60.55	0.31495
61	7	56	44.66	0.86205
62	7	56	47.51	0.78310
63	7	56	48.31	0.75782
64	7	56	68.05	0.12969
65	7	56	62.55	0.25515
66	7	56	64.98	0.19246
67	7	56	69.45	0.10693
68	7	56	76.93	0.03322
69	7	56	58.22	0.39355
70	7	56	55.78	0.48324
71	7	56	50.96	0.66557
72	7	56	66.27	0.16379
73	7	56	66.64	0.15618
74	7	56	72.22	0.07121
75	7	56	53.68	0.56337
76	7	56	48.23	0.76039
77	7	56	73.59	0.05752
78	7	56	50.18	0.69381
79	7	56	56.58	0.45317
80	7	56	57.73	0.41102
81	7	56	54.08	0.54780
82	7	56	78.20	0.02666
83	7	56	80.28	0.01837
84	7	56	44.89	0.85649
85	7	56	37.16	0.97538
86	7	56	51.61	0.64150
87	7	56	50.34	0.68814
88	7	56	57.88	0.40559
89	7	56	75.21	0.04431
90	7	56	62.40	0.25922

91	7	56	54.97	0.51369
92	7	56	60.03	0.33191
93	7	56	63.94	0.21778
94	7	56	63.47	0.23006
95	7	56	44.19	0.87310
96	7	56	57.26	0.42821
97	7	56	53.56	0.56770
98	7	56	75.29	0.04377
99	7	56	63.73	0.22324
100	7	56	46.02	0.82668
Combined P-value for all tests (Using KS method)				0.70253

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	14.97	0.82443
2	7	21	17.53	0.67848
3	7	21	25.25	0.23659
4	7	21	18.65	0.60747
5	7	21	33.04	0.04582
6	7	21	17.67	0.67000
7	7	21	14.06	0.86708
8	7	21	18.04	0.64668
9	7	21	16.67	0.73080
10	7	21	20.04	0.51893
11	7	21	13.93	0.87274
12	7	21	30.65	0.07968
13	7	21	13.74	0.88068
14	7	21	25.50	0.22617
15	7	21	13.11	0.90455
16	7	21	25.85	0.21211
17	7	21	16.25	0.75525
18	7	21	29.43	0.10410
19	7	21	17.80	0.66134
20	7	21	19.46	0.55597
21	7	21	11.91	0.94203
22	7	21	14.60	0.84240
23	7	21	27.88	0.14372
24	7	21	18.34	0.62713
25	7	21	18.03	0.64717
26	7	21	15.61	0.79141
27	7	21	17.00	0.71091
28	7	21	18.27	0.63202
29	7	21	27.48	0.15545

30	7	21	22.69	0.36061
31	7	21	14.71	0.83711
32	7	21	16.81	0.72232
33	7	21	33.93	0.03687
34	7	21	16.78	0.72416
35	7	21	27.91	0.14261
36	7	21	30.98	0.07406
37	7	21	23.25	0.33059
38	7	21	28.02	0.13948
39	7	21	16.95	0.71420
40	7	21	18.59	0.61122
41	7	21	19.50	0.55320
42	7	21	18.75	0.60134
43	7	21	26.17	0.20023
44	7	21	23.88	0.29904
45	7	21	13.93	0.87255
46	7	21	20.09	0.51581
47	7	21	25.04	0.24563
48	7	21	22.85	0.35221
49	7	21	26.59	0.18490
50	7	21	22.04	0.39737
51	7	21	18.41	0.62325
52	7	21	30.49	0.08252
53	7	21	19.40	0.55937
54	7	21	20.02	0.51977
55	7	21	12.08	0.93741
56	7	21	17.01	0.71071
57	7	21	19.64	0.54388
58	7	21	14.12	0.86440
59	7	21	14.19	0.86144
60	7	21	21.46	0.43129
61	7	21	24.37	0.27551
62	7	21	24.63	0.26370
63	7	21	18.43	0.62171
64	7	21	17.78	0.66312
65	7	21	32.00	0.05851
66	7	21	17.41	0.68588
67	7	21	31.51	0.06555
68	7	21	21.51	0.42842
69	7	21	16.82	0.72184
70	7	21	32.51	0.05198
71	7	21	14.54	0.84517
72	7	21	26.74	0.17967
73	7	21	21.74	0.41464
74	7	21	32.52	0.05177
75	7	21	17.20	0.69921
76	7	21	20.25	0.50533
77	7	21	19.82	0.53266
78	7	21	26.62	0.18395
79	7	21	27.27	0.16205
80	7	21	27.51	0.15474
81	7	21	27.88	0.14345
82	7	21	23.18	0.33450
83	7	21	16.74	0.72684
84	7	21	19.40	0.55935

85	7	21	12.83	0.91432
86	7	21	21.34	0.43860
87	7	21	22.97	0.34542
88	7	21	19.51	0.55222
89	7	21	25.34	0.23273
90	7	21	17.76	0.66444
91	7	21	18.17	0.63829
92	7	21	19.49	0.55379
93	7	21	24.66	0.26221
94	7	21	16.91	0.71658
95	7	21	18.65	0.60774
96	7	21	25.88	0.21125
97	7	21	19.65	0.54362
98	7	21	16.10	0.76382
99	7	21	25.37	0.23138
100	7	21	12.60	0.92209
Combined P-value for all tests (Using KS method)				0.43636

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	19.13	0.57652
2	7	21	20.78	0.47230
3	7	21	16.68	0.73050
4	7	21	16.31	0.75187
5	7	21	26.82	0.17692
6	7	21	10.14	0.97707
7	7	21	17.15	0.70175
8	7	21	29.72	0.09779
9	7	21	24.45	0.27157
10	7	21	40.14	0.00715
11	7	21	15.58	0.79298
12	7	21	11.60	0.94991
13	7	21	38.06	0.01269
14	7	21	35.01	0.02819
15	7	21	29.39	0.10501
16	7	21	17.79	0.66253
17	7	21	14.20	0.86093
18	7	21	13.66	0.88379
19	7	21	18.91	0.59068
20	7	21	15.97	0.77109
21	7	21	16.17	0.76014
22	7	21	15.77	0.78254
23	7	21	24.08	0.28897
24	7	21	23.92	0.29672
25	7	21	33.36	0.04237
26	7	21	17.51	0.67984
27	7	21	20.80	0.47131
28	7	21	13.17	0.90239
29	7	21	13.96	0.87131
30	7	21	26.98	0.17149
31	7	21	24.32	0.27804

32	7	21	29.67	0.09881
33	7	21	17.39	0.68709
34	7	21	24.73	0.25907
35	7	21	29.90	0.09397
36	7	21	28.90	0.11644
37	7	21	20.24	0.50581
38	7	21	26.47	0.18908
39	7	21	29.96	0.09283
40	7	21	14.48	0.84826
41	7	21	16.02	0.76848
42	7	21	13.23	0.90028
43	7	21	15.32	0.80681
44	7	21	37.05	0.01659
45	7	21	18.08	0.64424
46	7	21	26.68	0.18164
47	7	21	32.11	0.05706
48	7	21	32.23	0.05544
49	7	21	27.95	0.14166
50	7	21	23.01	0.34338
51	7	21	24.17	0.28491
52	7	21	22.16	0.39052
53	7	21	20.83	0.46954
54	7	21	27.11	0.16733
55	7	21	35.09	0.02761
56	7	21	36.94	0.01710
57	7	21	15.73	0.78456
58	7	21	28.15	0.13585
59	7	21	19.40	0.55980
60	7	21	15.67	0.78805
61	7	21	27.01	0.17059
62	7	21	23.68	0.30906
63	7	21	18.66	0.60709
64	7	21	30.37	0.08484
65	7	21	20.74	0.47497
66	7	21	16.44	0.74426
67	7	21	19.47	0.55499
68	7	21	19.04	0.58268
69	7	21	21.26	0.44331
70	7	21	24.35	0.27654
71	7	21	24.50	0.26936
72	7	21	22.12	0.39281
73	7	21	20.52	0.48827
74	7	21	15.00	0.82271
75	7	21	22.88	0.35050
76	7	21	15.44	0.80024
77	7	21	15.58	0.79264
78	7	21	25.29	0.23477
79	7	21	27.10	0.16770
80	7	21	14.84	0.83105
81	7	21	11.73	0.94651
82	7	21	21.57	0.42466
83	7	21	26.51	0.18765
84	7	21	28.45	0.12773
85	7	21	13.97	0.87083
86	7	21	23.75	0.30515

87	7	21	35.76	0.02328
88	7	21	15.30	0.80756
89	7	21	29.89	0.09426
90	7	21	14.34	0.85459
91	7	21	14.53	0.84579
92	7	21	24.22	0.28241
93	7	21	16.67	0.73063
94	7	21	23.62	0.31203
95	7	21	21.07	0.45439
96	7	21	19.40	0.55941
97	7	21	19.49	0.55353
98	7	21	17.23	0.69736
99	7	21	14.90	0.82794
100	7	21	16.78	0.72429
Combined P-value for all tests (Using KS method)				0.27813

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	0.67063	1.00000
Suits Test	0.43636	1.00000
Hand Types Test	0.59999	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.

4.2 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	0.70253	1.00000

Suits Test	0.27813	1.00000
Hands Type Test	0.54113	1.00000
Combined P-Value using Holm's Method		0.83439

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

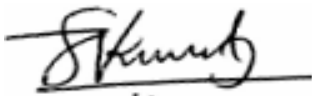
Analysis of actual data from game logs for 'Hand Types', 'Ranks' and 'Suits' for **52-card decks** and **36-card decks** indicated statistical randomness.

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: 20 January, 2020

Signed:



Geoff Nicoll
Principal Consultant
iTech Labs Australia
Date: 20 January, 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.