

# Poker Cards Analysis - April 2023

**The Directors** 

Entain Plc

This is to confirm that iTech Labs has examined the game logs for Poker games for the period **Apr 01, 2023** to **Apr 30, 2023** 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 pvalues, and the combined p-value result of this test is taken as the final result of the Poker hand types statistics tests.

Test No.	DOF	ChiSqr	P-Value
1	9	13.15 🚬	0.15588
2	9	3.36	0.94816
3	9	3.53	0.93933
4	9	11.92	0.21772
5	9	2.00	0.99140
6	9	9.47	0.39539
7	9	11.98	0.21439
8	9	9.16	0.42253
9	9	14.69	0.09993
10	9	14.16	0.11680
11	9	4.32	0.88889
12	9	9.27	0.41314
13	9	11.26	0.25814
14	9	10.31	0.32564
15	9	15.40	0.08053
16	9	15.28	0.08351
17	9	7.56	0.57875
18	9	10.15	0.33876
19	9	7.21	0.61496
20	9	8.49	0.48539
21	9	9.13	0.42511
22	9	7.50	0.58535
23	9	12.00	0.21352
24	9	6.54	0.68500
25	9	7.06	0.63087

#### **1.1** Poker hand types statistics for 52 cards deck:

26	9	8.28	0.50647	
27	9	20.59	0.01461	
28	9	9.82	0.36557	
29	9	14.44	0.10762	
30	9	6.50	0.68859	
31	9	10.21	0.33385	
32	9	4.39	0.88404	
33	9	11.69	0.23120	
34	9	6.88	0.65002	
35	9	14.39	0.10921	
36	9	7.97	0.53748	
37	9	9.19	0.42015	
38	9	7.57	0.57835	
39	9	10.37	0.32150	
40	9	12.94	0.16547	
41	9	8.46	0.48820	
42	9	15.20	0.08554	
43	9	8.51	0.48369	
44	9	3.85	0.92124	
45	9	6.57	0.68195	
46	9	9,22	0.41729	
47	9	13.05	0.16028	
48	9	7 54	0.58098	
49	9	15 58	0.07614	
50	9	7 97	0.53715	
50	9	10.15	0.33840	
52	9	10.15	0.32054	
53	9	8.84	0.52031	1
53	9	12 35	0.19235	
55	9	11.07	0.13421	
55	9	11.07	0.27030	
56	0	/ 02	0.9/016	
56	9	4.93	0.84016	
56 57 58	9 9 9	4.93 10.58	0.84016	
56 57 58 59	9 9 9	4.93 10.58 5.73 10.15	0.84016 0.30544 0.76646 0.33854	
56 57 58 59 60	9 9 9 9	4.93 10.58 5.73 10.15	0.84016 0.30544 0.76646 0.33854 0.26452	
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56 57 58 59 60 61 61	9 9 9 9 9 9 9	4.93 10.58 5.73 10.15 9.83 3.02	0.84016 0.30544 0.76646 0.33854 0.36452 0.96359 0.24000	
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56 57 58 59 60 61 62 63 63	9 9 9 9 9 9 9 9 9 9	4.93 10.58 5.73 10.15 9.83 3.02 10.01 16.23	0.84016 0.30544 0.76646 0.33854 0.36452 0.96359 0.34990 0.06229	
56 57 58 59 60 61 62 63 63 64	9 9 9 9 9 9 9 9 9 9 9 9	4.93 10.58 5.73 10.15 9.83 3.02 10.01 16.23 7.35	0.84016 0.30544 0.76646 0.33854 0.36452 0.96359 0.34990 0.06229 0.60076	
56 57 58 59 60 61 62 63 63 64 65	9 9 9 9 9 9 9 9 9 9 9 9 9 9	4.93 10.58 5.73 10.15 9.83 3.02 10.01 16.23 7.35 9.64	0.84016 0.30544 0.76646 0.33854 0.36452 0.96359 0.34990 0.06229 0.60076 0.38033 0.96030	
56 57 58 59 60 61 62 63 64 64 65 66	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	4.93 10.58 5.73 10.15 9.83 3.02 10.01 16.23 7.35 9.64 4.69 0.45	0.84016 0.30544 0.76646 0.33854 0.36452 0.96359 0.34990 0.06229 0.60076 0.38033 0.86028	
56 57 58 59 60 61 62 63 64 65 66 66 67	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	4.93 10.58 5.73 10.15 9.83 3.02 10.01 16.23 7.35 9.64 4.69 9.45 6.25	0.84016 0.30544 0.76646 0.33854 0.36452 0.96359 0.34990 0.06229 0.60076 0.38033 0.86028 0.39714	
56           57           58           59           60           61           62           63           64           65           66           67           68	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	4.93 10.58 5.73 10.15 9.83 3.02 10.01 16.23 7.35 9.64 4.69 9.45 6.25 11.46	0.84016 0.30544 0.76646 0.33854 0.36452 0.96359 0.34990 0.06229 0.60076 0.38033 0.86028 0.39714 0.71503	
56           57           58           59           60           61           62           63           64           65           66           67           68           69	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	4.93 10.58 5.73 10.15 9.83 3.02 10.01 16.23 7.35 9.64 4.69 9.45 6.25 11.46 7.54	0.84016 0.30544 0.76646 0.33854 0.36452 0.96359 0.34990 0.06229 0.60076 0.38033 0.86028 0.39714 0.71503 0.24536	
56           57           58           59           60           61           62           63           64           65           66           67           68           69           70	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	4.93 10.58 5.73 10.15 9.83 3.02 10.01 16.23 7.35 9.64 4.69 9.45 6.25 11.46 7.54 6.25	0.84016 0.30544 0.76646 0.33854 0.36452 0.96359 0.34990 0.06229 0.60076 0.38033 0.86028 0.39714 0.71503 0.24536 0.58085	
56           57           58           59           60           61           62           63           64           65           66           67           68           69           70           71	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	4.93 10.58 5.73 10.15 9.83 3.02 10.01 16.23 7.35 9.64 4.69 9.45 6.25 11.46 7.54 6.76 0.25	0.84016 0.30544 0.76646 0.33854 0.36452 0.96359 0.34990 0.06229 0.60076 0.38033 0.86028 0.39714 0.71503 0.24536 0.58085 0.66193	
56           57           58           59           60           61           62           63           64           65           66           67           68           69           70           71           72	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	4.93 10.58 5.73 10.15 9.83 3.02 10.01 16.23 7.35 9.64 4.69 9.45 6.25 11.46 7.54 6.76 8.25 7.24	0.84016 0.30544 0.76646 0.33854 0.36452 0.96359 0.34990 0.06229 0.60076 0.38033 0.86028 0.39714 0.71503 0.24536 0.58085 0.66193 0.50873	
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56           57           58           59           60           61           62           63           64           65           66           67           68           69           70           71           72           73           74	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	4.93 10.58 5.73 10.15 9.83 3.02 10.01 16.23 7.35 9.64 4.69 9.45 6.25 11.46 7.54 6.76 8.25 7.24 3.62 3.65 	0.84016 0.30544 0.76646 0.33854 0.36452 0.96359 0.34990 0.06229 0.60076 0.38033 0.86028 0.39714 0.71503 0.24536 0.58085 0.66193 0.50873 0.61249 0.93487 0.93313	
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56           57           58           59           60           61           62           63           64           65           66           67           68           69           70           71           72           73           74           75           76           77           78           79	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	4.93         10.58         5.73         10.15         9.83         3.02         10.01         16.23         7.35         9.64         4.69         9.45         6.25         11.46         7.54         6.76         8.25         7.24         3.62         3.65         4.65         19.64         4.06         10.10	0.84016 0.30544 0.76646 0.33854 0.36452 0.96359 0.34990 0.06229 0.60076 0.38033 0.86028 0.39714 0.71503 0.24536 0.58085 0.66193 0.50873 0.61249 0.93487 0.93313 0.86408 0.02029 0.90724 0.34232	
56           57           58           59           60           61           62           63           64           65           66           67           68           69           70           71           72           73           74           75           76           77           78           79           80	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	4.93         10.58         5.73         10.15         9.83         3.02         10.01         16.23         7.35         9.64         4.69         9.45         6.25         11.46         7.54         6.76         8.25         7.24         3.62         3.65         4.65         19.64         4.06         10.10         4.92	0.84016 0.30544 0.76646 0.33854 0.36452 0.96359 0.34990 0.06229 0.60076 0.38033 0.86028 0.39714 0.71503 0.24536 0.58085 0.66193 0.50873 0.61249 0.93487 0.93313 0.86408 0.02029 0.90724 0.34232 0.84085	

iTech Labs ABN 80 108 249 761 www.itechlabs.com Suite 24, 40 Montclair Ave, Glen Waverley, VIC 3150, Australia. Tel. +61 3 9561 9955

82	9	5.01	0.83336		
83	9	4.32	0.88902		
84	9	5.95	0.74526		
85	9	6.10	0.72983		
86	9	2.29	0.98604		
87	9	7.75	0.55991		
88	9	4.87	0.84529		
89	9	13.80	0.12971		
90	9	8.07	0.52693		
91	9	5.92	0.74801		
92	9	5.40	0.79785		
93	9	8.58	0.47714		
94	9	10.89	0.28306		
95	9	3.71	0.92925		
96	9	4.69	0.86018		
97	9	2.59	0.97847		
98	9	14.75	0.09789		
99	9	12.34	0.19470		
100	9	4.43	0.88063		
Combined P-va	Combined P-value for all tests (Using KS method)				

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	8	5.05	0.75220		
2	8	5.50	0.70330		
Combined P-value for all tests (Using KS method) N/A (Insufficient data)					

Notes:

- 1) Since the number of samples available was insufficient to ensure at least 5 samples in the lowest probability hand type, (Royal Flush), the chi-square test has been performed by merging the Royal Flush and Straight Flush categories.
- 2) As the total number of tests (2) is insufficient to perform a meaningful KS Test, individual p-values from these tests are carried over to the next stage for combining using the Holm's method.
- 3) Since the number of games played each month using 36 card decks is small, the number of samples available this month as well as a few previous months were insufficient to perform a meaningful statistical analysis. Hence the analysis performed this month was done using the cumulative data for the last 4 months i.e Jan 2023 to Apr 2023.

# 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	78.46	0.65003

2	7	84	71.43	0.83427										
3	7	84	82.04	0.54016										
4	7	84	81.49	0.55727										
5	7	84	81.37	0.56106										
6	7	84	86.79	0.39594										
7	7	84	88.19	0.35607										
8	7	84	73.78	0.77973										
9	7	84	54.84	0.99424										
10	7	84	71.28	0.83742										
11	7	84	83.42	0.49742										
12	7	84	81.22	0.56578										
13	7	84	69.39	0.87449										
14	7	84	72 55	0.80923										
15	7	84	70.27	0.85795										
16	7	84	79.81	0.60913										
17	7	84	88.67	0.34273										
18	7	84	100.09	0.11117										
10	7	84	76 34	0.71167										
20	7	84	89.63	0.71107										
20	7	84	85.53	0.31035										
21	7	84	80.73	0.43310										
22	7	84	78.97	0.30090										
23	7	84	70.07	0.12007										
24	7	04 94	74.60	0.13007										
25	7	04	74.09	0.75050										
20	7	04	79.95	0.60492										
27	7	04	81.87	0.54534										
28	7	04	90.57	0.29266										
29	/	04	85.00	0.51021										
20	7	04	100.42	0.10000										
30	7	84	100.42	0.10686										
30 31	7 7 7	84 84	100.42 82.56	0.10686										
30 31 32	7 7 7 7	84 84 84	100.42 82.56 72.92	0.10686 0.52397 0.80066										
30 31 32 33 24	7 7 7 7 7	84 84 84 84	100.42 82.56 72.92 97.93	0.10686 0.52397 0.80066 0.14208 0.14246										
30 31 32 33 34 25	7 7 7 7 7 7	84 84 84 84 84 84	100.42 82.56 72.92 97.93 97.90	0.10686 0.52397 0.80066 0.14208 0.14246 0.12778										
30 31 32 33 34 35 26	7 7 7 7 7 7 7 7	84 84 84 84 84 84 84	100.42 82.56 72.92 97.93 97.90 98.88 110.55	0.10686 0.52397 0.80066 0.14208 0.14246 0.12778										
30 31 32 33 34 35 36 37	7 7 7 7 7 7 7 7 7	84 84 84 84 84 84 84 84	100.42 82.56 72.92 97.93 97.90 98.88 110.55 70.55	0.10686 0.52397 0.80066 0.14208 0.14246 0.12778 0.02773 0.95328										
30 31 32 33 34 35 36 37 28	7 7 7 7 7 7 7 7 7 7	84 84 84 84 84 84 84 84 84	100.42 82.56 72.92 97.93 97.90 98.88 110.55 70.55	0.10686 0.52397 0.80066 0.14208 0.14246 0.12778 0.02773 0.85238										
30 31 32 33 34 35 36 37 38 30	7 7 7 7 7 7 7 7 7 7 7	84 84 84 84 84 84 84 84 84 84	100.42 82.56 72.92 97.93 97.90 98.88 110.55 70.55 92.76 07.21	0.10686 0.52397 0.80066 0.14208 0.14246 0.12778 0.02773 0.85238 0.24054 0.15268										
30 31 32 33 34 35 36 37 38 39 40	7 7 7 7 7 7 7 7 7 7 7 7 7	84 84 84 84 84 84 84 84 84 84 84	100.42 82.56 72.92 97.93 97.90 98.88 110.55 70.55 92.76 97.21 74.00	0.10686 0.52397 0.80066 0.14208 0.14246 0.12778 0.02773 0.85238 0.24054 0.15368										
30 31 32 33 34 35 36 37 38 39 40	7 7 7 7 7 7 7 7 7 7 7 7 7 7	84 84 84 84 84 84 84 84 84 84 84 84	100.42 82.56 72.92 97.93 97.90 98.88 110.55 70.55 92.76 97.21 74.00 78.53	0.10686 0.52397 0.80066 0.14208 0.14246 0.12778 0.02773 0.85238 0.24054 0.15368 0.77402 0.64902										
30 31 32 33 34 35 36 37 38 39 40 41	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	84 84 84 84 84 84 84 84 84 84 84 84 84	100.42 82.56 72.92 97.93 97.90 98.88 110.55 70.55 92.76 97.21 74.00 78.53 82.65	0.10686 0.52397 0.80066 0.14208 0.14246 0.12778 0.02773 0.85238 0.24054 0.15368 0.77402 0.64802 0.53120										
30 31 32 33 34 35 36 37 38 39 40 41 41 42 43	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	84 84 84 84 84 84 84 84 84 84 84 84 84 8	100.42 82.56 72.92 97.93 97.90 98.88 110.55 70.55 92.76 97.21 74.00 78.53 82.65 72.52	0.10686 0.52397 0.80066 0.14208 0.14246 0.12778 0.02773 0.85238 0.24054 0.15368 0.77402 0.64802 0.52129 0.90059										
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	84 84 84 84 84 84 84 84 84 84 84 84 84 8	100.42 82.56 72.92 97.93 97.90 98.88 110.55 70.55 92.76 97.21 74.00 78.53 82.65 72.53 87.79	0.10686 0.52397 0.80066 0.14208 0.14246 0.12778 0.02773 0.85238 0.24054 0.15368 0.77402 0.64802 0.52129 0.80958 0.26742										
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	84         84	100.42 82.56 72.92 97.90 98.88 110.55 70.55 92.76 97.21 74.00 78.53 82.65 72.53 87.78 93.75	0.10686 0.52397 0.80066 0.14208 0.14246 0.12778 0.02773 0.85238 0.24054 0.15368 0.77402 0.64802 0.52129 0.80958 0.36742 0.21991										
30         31         32         33         34         35         36         37         38         39         40         41         42         43         44         45         46	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	84 84 84 84 84 84 84 84 84 84 84 84 84 8	100.42 82.56 72.92 97.90 98.88 110.55 70.55 92.76 97.21 74.00 78.53 82.65 72.53 87.78 93.75 75.42	0.10686 0.52397 0.80066 0.14208 0.14246 0.12778 0.02773 0.85238 0.24054 0.15368 0.77402 0.64802 0.52129 0.80958 0.36742 0.21881 0.72662										
30         31         32         33         34         35         36         37         38         39         40         41         42         43         44         45         46	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	84         84	100.42 82.56 72.92 97.93 97.90 98.88 110.55 70.55 92.76 97.21 74.00 78.53 82.65 72.53 82.65 72.53 87.78 93.75 75.43	0.10686 0.52397 0.80066 0.14208 0.14246 0.12778 0.02773 0.85238 0.24054 0.15368 0.77402 0.64802 0.52129 0.80958 0.36742 0.21881 0.73663 0.41257										
30         31         32         33         34         35         36         37         38         39         40         41         42         43         44         45         46         47         48	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	84          84	100.42 82.56 72.92 97.93 97.90 98.88 110.55 70.55 92.76 97.21 74.00 78.53 82.65 72.53 82.65 72.53 87.78 93.75 75.43 86.22	0.10686 0.52397 0.80066 0.14208 0.14246 0.12778 0.02773 0.85238 0.24054 0.15368 0.77402 0.64802 0.52129 0.80958 0.36742 0.21881 0.73663 0.41257 0.21608										
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84          84	100.42 82.56 72.92 97.93 97.90 98.88 110.55 70.55 92.76 97.21 74.00 78.53 82.65 72.53 82.65 72.53 87.78 93.75 75.43 86.22 93.88 79.05 79.30 83.29 88.47 84.17 78.83	0.10686 0.52397 0.80066 0.14208 0.14246 0.12778 0.02773 0.85238 0.24054 0.15368 0.77402 0.64802 0.52129 0.80958 0.36742 0.21881 0.73663 0.41257 0.21608 0.63241 0.62483 0.50129 0.34808 0.47423 0.63891 0.63891												
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84          84	100.42 82.56 72.92 97.90 98.88 110.55 70.55 92.76 97.21 74.00 78.53 82.65 72.53 87.78 93.75 75.43 86.22 93.88 79.05 79.30 83.29 88.47 84.17 78.83 61.46 82.60	0.10686 0.52397 0.80066 0.14208 0.14208 0.14246 0.12778 0.02773 0.85238 0.24054 0.15368 0.77402 0.64802 0.52129 0.80958 0.36742 0.21881 0.73663 0.41257 0.21608 0.63241 0.62483 0.50129 0.34808 0.47423 0.63891 0.96939 0.52291 0.65161												

58	7	84	82,79	0.51682
59	7	84	77.23	0.68627
60	7	84	84.09	0.47682
61	7	84	76.20	0.71566
62	7	84	87.47	0.37616
63	7	84	121 27	0.00487
64	7	84	84 13	0 47558
65	7	84	106 75	0.04762
66	7	84	112 38	0.02103
67	7	84	97.03	0.15664
68	7	84	66.31	0.92243
69	7	84	91 94	0 25931
70	7	84	93.13	0.23229
70	7	84	108 65	0.03654
72	7	84	86.82	0.09091
72	7	84	70.89	0.35105
73	7	84	67.95	0.01312
75	7	84	114 48	0.05051
75	7	84	86.63	0.01517
70	7	84	84 45	0.46572
78	7	84	95 50	0.10372
70	7	84	86.55	0.10392
80	7	84	51.99	0.99765
81	7	84	76.32	0.33703
82	7	84	70.32	0.81683
83	7	84	96.57	0.01005
84	7	84	84.21	0.10117
85	7	84	86.81	0.39528
86	7	84	72 15	0.33320
87	7	84	82 70	0.51955
88	7	84	109.61	0.03180
89	7	84	85.08	0.03100
90	7	84	80.22	0.59643
91	7	84	85.72	0.33015
92	7	84	95.69	0.12750
93	7	84	101.29	0.10010
94	7	84	111 12	0.02546
95	, 7	84	87 98	0.51088
96	7	84	62.90	0.91000
97	7	84	110 67	0.00535
97	7	8/	81 30	0.00079
90	7	8/	91.50	0.30330
100	7	8/	60 83	0.20017
100	/	04	0.60	0.000+5
Combined P.v.	l alua for all tosts	(Lleing KS moth	od)	0 69645
Complited P-Va	0.00010			

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	53.62	0.56533		
2	7	56	47.14	0.79434		
3	7	56	45.34	0.84491		
4	7	56	54.33	0.53847		
5	7	56	57.24	0.42880		
6	7	56	61.71	0.27948		
7	7	56	59.65	0.34430		
8	7	56	61.60	0.28270		
9	7	56	67.63	0.13724		
10	7	56	63.95	0.21759		
Combined P-va	alue for all tests	(Using KS meth	od)	0.98569		

Notes:

1) Since the number of games played each month using 36 card decks is small, the number of samples available this month as well as a few previous months were insufficient to perform a meaningful statistical analysis. Hence the analysis performed this month was done using the cumulative data for the last 4 months - i.e Jan 2023 to Apr 2023.

#### 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.

				0
Test No.	Positions	DOF	ChiSqr	P-Value
1	7	21	23.86	0.30009
2	7	21	22.54	0.36888
3	7	21	21.07	0.45487
4	7	21	40.38	0.00668
5	7	21	11.86	0.94324
6	7	21	7.65	0.99646
7	7	21	16.44	0.74450
8	7	21	27.19	0.16460
9	7	21	17.75	0.66470
10	7	21	14.81	0.83252
11	7	21	26.46	0.18957
12	7	21	17.29	0.69337
13	7	21	31.52	0.06548
14	7	21	13.24	0.90006
15	7	21	18.84	0.59509
16	7	21	21.09	0.45321
17	7	21	32.76	0.04895
18	7	21	9.56	0.98409
19	7	21	17.35	0.68988
20	7	21	19.58	0.54812
21	7	21	18.33	0.62788
22	7	21	24.88	0.25259
23	7	21	19.05	0.58183
24	7	21	24.40	0.27404

#### 3.1 Poker suits statistics for 52 cards deck

25	7	21	23.86	0.30004																				
26	7	21	16.98	0.71216																				
27	7	21	38.77	0.01045																				
28	7	21	21.79	0.41149																				
29	7	21	24.50	0.26945																				
30	7	21	14.12	0.86458																				
31	7	21	18.46	0.61954																				
32	7	21	8.98	0.98939																				
33	7	21	21.04	0.45637																				
34	7	21	16.20	0.75842																				
35	7	21	15.77	0.78235																				
36	7	21	28.03	0.13941																				
37	7	21	22.48	0.37232																				
38	7	21	25.73	0.21681																				
30	7	21	17.02	0 70965																				
40	7	21	27.35	0.15970																				
41	7	21	18 35	0.13570																				
42	7	21	26.04	0.02031																				
42	7	21	12.04	0.17271																				
43	/	21	12.94	0.91085																				
44	/	21	14.09	0.865/1																				
45	/	21	20.65	0.48019																				
46	/	21	24.22	0.28268																				
47	7	21	21.91	0.40449																				
48	7	21	14.22	0.85992																				
49	7	21	20.08	0.51611																				
50	7	21	19.58	0.54783																				
51	7	21	14.18	0.86164																				
52	7	21	32.60	0.05079																				
53	7	21	22.45	0.37412																				
53 54	7 7	21 21	22.45 26.12	0.37412 0.20179																				
53 54 55	7 7 7	21 21 21	22.45 26.12 19.45	0.37412 0.20179 0.55604																				
53 54 55 56	7 7 7 7 7	21 21 21 21 21	22.45 26.12 19.45 20.61	0.37412 0.20179 0.55604 0.48316																				
53 54 55 56 57	7 7 7 7 7 7	21 21 21 21 21 21 21	22.45 26.12 19.45 20.61 17.66	0.37412 0.20179 0.55604 0.48316 0.67039																				
53 54 55 56 57 58	7 7 7 7 7 7 7	21 21 21 21 21 21 21 21	22.45 26.12 19.45 20.61 17.66 34.12	0.37412 0.20179 0.55604 0.48316 0.67039 0.03515																				
53 54 55 56 57 58 59	7 7 7 7 7 7 7 7 7	21 21 21 21 21 21 21 21 21	22.45 26.12 19.45 20.61 17.66 34.12 30.38	0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457																				
53 54 55 56 57 58 59 60	7 7 7 7 7 7 7 7 7 7	21 21 21 21 21 21 21 21 21 21 21	22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04	0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851																				
53 54 55 56 57 58 59 60 61	7 7 7 7 7 7 7 7 7 7 7 7	21 21 21 21 21 21 21 21 21 21 21	22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60	0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619																				
53 54 55 56 57 58 59 60 61 61 62	7 7 7 7 7 7 7 7 7 7 7 7 7	21 21 21 21 21 21 21 21 21 21 21 21 21	22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30	0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897																				
53 54 55 56 57 58 59 60 61 61 62 63	7 7 7 7 7 7 7 7 7 7 7 7 7 7	21 21 21 21 21 21 21 21 21 21 21 21 21	22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.37	0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562																				
53 54 55 56 57 58 59 60 61 61 62 63 63 64	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	21 21 21 21 21 21 21 21 21 21 21 21 21 2	22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.30 24.37 18.45	0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039																				
53 54 55 56 57 58 59 60 61 61 62 63 63 64 65	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	21 21 21 21 21 21 21 21 21 21 21 21 21 2	22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.37 18.45 27.86	0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039 0.14425																				
53 54 55 56 57 58 59 60 61 61 62 63 63 64 65 66	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	21 21 21 21 21 21 21 21 21 21 21 21 21 2	22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.30 24.37 18.45 27.86 19.95	0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039 0.14425 0.52435																				
53         54         55         56         57         58         59         60         61         62         63         64         65         66         67	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	21 21 21 21 21 21 21 21 21 21 21 21 21 2	22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.30 24.37 18.45 27.86 19.95 28.45	0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039 0.14425 0.52435 0.12787																				
53         54         55         56         57         58         59         60         61         62         63         64         65         66         67         68	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	21 21 21 21 21 21 21 21 21 21 21 21 21 2	22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.30 24.37 18.45 27.86 19.95 28.45 27.49	0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039 0.14425 0.52435 0.12787 0.15517																				
53         54         55         56         57         58         59         60         61         62         63         64         65         66         67         68         69	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	21 21 21 21 21 21 21 21 21 21 21 21 21 2	22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.30 24.37 18.45 27.86 19.95 28.45 27.49 23.49	0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039 0.14425 0.52435 0.12787 0.15517 0.31836																				
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53         54         55         56         57         58         59         60         61         62         63         64         65         66         67         68         69         70         71         72	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	21 21 21 21 21 21 21 21 21 21 21 21 21 2	22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.30 24.37 18.45 27.86 19.95 28.45 27.49 23.49 21.09 15.92 10.64	0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039 0.14425 0.52435 0.12787 0.15517 0.31836 0.45330 0.77417 0.96940																				
53         54         55         56         57         58         59         60         61         62         63         64         65         66         67         68         69         70         71         72         73	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	21 21 21 21 21 21 21 21 21 21 21 21 21 2	22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.30 24.37 18.45 27.86 19.95 28.45 27.49 23.49 21.09 15.92 10.64 15.44	0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039 0.14425 0.52435 0.12787 0.15517 0.31836 0.45330 0.77417 0.96940 0.8007																				
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53         54         55         56         57         58         59         60         61         62         63         64         65         66         67         68         69         70         71         72         73         74         75	7         7 <tr td=""> <!--</td--><td>21 21 21 21 21 21 21 21 21 21 21 21 21 2</td><td>22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.30 24.37 18.45 27.86 19.95 28.45 27.49 23.49 21.09 15.92 10.64 15.44 23.93 14.15</td><td>0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039 0.14425 0.52435 0.12787 0.15517 0.31836 0.45330 0.77417 0.96940 0.80007 0.29624 0.86293 0.27426</td></tr> <tr><td>53         54         55         56         57         58         59         60         61         62         63         64         65         66         67         68         69         70         71         72         73         74         75         76</td><td>7         7      <tr td=""> <!--</td--><td>21 21 21 21 21 21 21 21 21 21</td><td>22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.37 18.45 27.86 19.95 28.45 27.49 23.49 21.09 15.92 10.64 15.44 23.93 14.15 24.40</td><td>0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039 0.14425 0.52435 0.12787 0.15517 0.31836 0.45330 0.77417 0.96940 0.80007 0.29624 0.86293 0.27426</td></tr><tr><td>53         54         55         56         57         58         59         60         61         62         63         64         65         66         67         68         69         70         71         72         73         74         75         76         77</td><td>7         7      <tr td=""> <!--</td--><td>21 21 21 21 21 21 21 21 21 21</td><td>22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.37 18.45 27.86 19.95 28.45 27.49 23.49 21.09 15.92 10.64 15.44 23.93 14.15 24.40 16.08</td><td>0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039 0.14425 0.52435 0.12787 0.15517 0.31836 0.45330 0.77417 0.96940 0.80007 0.29624 0.86293 0.27426 0.76539</td></tr><tr><td>53         54         55         56         57         58         59         60         61         62         63         64         65         66         67         68         69         70         71         72         73         74         75         76         77         78</td><td>7         7      <tr td=""> <!--</td--><td>21 21 21 21 21 21 21 21 21 21</td><td>22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.37 18.45 27.86 19.95 28.45 27.49 23.49 21.09 15.92 10.64 15.92 10.64 15.92 10.64 15.44 23.93 14.15 24.40 16.08 23.46</td><td>0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039 0.14425 0.52435 0.12787 0.15517 0.31836 0.45330 0.77417 0.36940 0.8007 0.29624 0.86293 0.27426 0.76539 0.32001</td></tr><tr><td>53         54         55         56         57         58         59         60         61         62         63         64         65         66         67         68         69         70         71         72         73         74         75         76         77         78         79</td><td>7         7      <tr td=""> <!--</td--><td>21 21 21 21 21 21 21 21 21 21</td><td>22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.37 18.45 27.86 19.95 28.45 27.49 23.49 21.09 15.92 10.64 15.92 10.64 15.92 10.64 15.44 23.93 14.15 24.40 16.08 23.46 28.96</td><td>0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039 0.14425 0.52435 0.12787 0.15517 0.31836 0.45330 0.77417 0.31836 0.45330 0.77417 0.96940 0.80007 0.29624 0.86293 0.27426 0.76539 0.32001 0.11506</td></tr></td></tr></td></tr></td></tr></td></tr>	21 21 21 21 21 21 21 21 21 21 21 21 21 2	22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.30 24.37 18.45 27.86 19.95 28.45 27.49 23.49 21.09 15.92 10.64 15.44 23.93 14.15	0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039 0.14425 0.52435 0.12787 0.15517 0.31836 0.45330 0.77417 0.96940 0.80007 0.29624 0.86293 0.27426	53         54         55         56         57         58         59         60         61         62         63         64         65         66         67         68         69         70         71         72         73         74         75         76	7         7 <tr td=""> <!--</td--><td>21 21 21 21 21 21 21 21 21 21</td><td>22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.37 18.45 27.86 19.95 28.45 27.49 23.49 21.09 15.92 10.64 15.44 23.93 14.15 24.40</td><td>0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039 0.14425 0.52435 0.12787 0.15517 0.31836 0.45330 0.77417 0.96940 0.80007 0.29624 0.86293 0.27426</td></tr> <tr><td>53         54         55         56         57         58         59         60         61         62         63         64         65         66         67         68         69         70         71         72         73         74         75         76         77</td><td>7         7      <tr td=""> <!--</td--><td>21 21 21 21 21 21 21 21 21 21</td><td>22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.37 18.45 27.86 19.95 28.45 27.49 23.49 21.09 15.92 10.64 15.44 23.93 14.15 24.40 16.08</td><td>0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039 0.14425 0.52435 0.12787 0.15517 0.31836 0.45330 0.77417 0.96940 0.80007 0.29624 0.86293 0.27426 0.76539</td></tr><tr><td>53         54         55         56         57         58         59         60         61         62         63         64         65         66         67         68         69         70         71         72         73         74         75         76         77         78</td><td>7         7      <tr td=""> <!--</td--><td>21 21 21 21 21 21 21 21 21 21</td><td>22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.37 18.45 27.86 19.95 28.45 27.49 23.49 21.09 15.92 10.64 15.92 10.64 15.92 10.64 15.44 23.93 14.15 24.40 16.08 23.46</td><td>0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039 0.14425 0.52435 0.12787 0.15517 0.31836 0.45330 0.77417 0.36940 0.8007 0.29624 0.86293 0.27426 0.76539 0.32001</td></tr><tr><td>53         54         55         56         57         58         59         60         61         62         63         64         65         66         67         68         69         70         71         72         73         74         75         76         77         78         79</td><td>7         7      <tr td=""> <!--</td--><td>21 21 21 21 21 21 21 21 21 21</td><td>22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.37 18.45 27.86 19.95 28.45 27.49 23.49 21.09 15.92 10.64 15.92 10.64 15.92 10.64 15.44 23.93 14.15 24.40 16.08 23.46 28.96</td><td>0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039 0.14425 0.52435 0.12787 0.15517 0.31836 0.45330 0.77417 0.31836 0.45330 0.77417 0.96940 0.80007 0.29624 0.86293 0.27426 0.76539 0.32001 0.11506</td></tr></td></tr></td></tr></td></tr>	21 21 21 21 21 21 21 21 21 21	22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.37 18.45 27.86 19.95 28.45 27.49 23.49 21.09 15.92 10.64 15.44 23.93 14.15 24.40	0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039 0.14425 0.52435 0.12787 0.15517 0.31836 0.45330 0.77417 0.96940 0.80007 0.29624 0.86293 0.27426	53         54         55         56         57         58         59         60         61         62         63         64         65         66         67         68         69         70         71         72         73         74         75         76         77	7         7 <tr td=""> <!--</td--><td>21 21 21 21 21 21 21 21 21 21</td><td>22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.37 18.45 27.86 19.95 28.45 27.49 23.49 21.09 15.92 10.64 15.44 23.93 14.15 24.40 16.08</td><td>0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039 0.14425 0.52435 0.12787 0.15517 0.31836 0.45330 0.77417 0.96940 0.80007 0.29624 0.86293 0.27426 0.76539</td></tr> <tr><td>53         54         55         56         57         58         59         60         61         62         63         64         65         66         67         68         69         70         71         72         73         74         75         76         77         78</td><td>7         7      <tr td=""> <!--</td--><td>21 21 21 21 21 21 21 21 21 21</td><td>22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.37 18.45 27.86 19.95 28.45 27.49 23.49 21.09 15.92 10.64 15.92 10.64 15.92 10.64 15.44 23.93 14.15 24.40 16.08 23.46</td><td>0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039 0.14425 0.52435 0.12787 0.15517 0.31836 0.45330 0.77417 0.36940 0.8007 0.29624 0.86293 0.27426 0.76539 0.32001</td></tr><tr><td>53         54         55         56         57         58         59         60         61         62         63         64         65         66         67         68         69         70         71         72         73         74         75         76         77         78         79</td><td>7         7      <tr td=""> <!--</td--><td>21 21 21 21 21 21 21 21 21 21</td><td>22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.37 18.45 27.86 19.95 28.45 27.49 23.49 21.09 15.92 10.64 15.92 10.64 15.92 10.64 15.44 23.93 14.15 24.40 16.08 23.46 28.96</td><td>0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039 0.14425 0.52435 0.12787 0.15517 0.31836 0.45330 0.77417 0.31836 0.45330 0.77417 0.96940 0.80007 0.29624 0.86293 0.27426 0.76539 0.32001 0.11506</td></tr></td></tr></td></tr>	21 21 21 21 21 21 21 21 21 21	22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.37 18.45 27.86 19.95 28.45 27.49 23.49 21.09 15.92 10.64 15.44 23.93 14.15 24.40 16.08	0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039 0.14425 0.52435 0.12787 0.15517 0.31836 0.45330 0.77417 0.96940 0.80007 0.29624 0.86293 0.27426 0.76539	53         54         55         56         57         58         59         60         61         62         63         64         65         66         67         68         69         70         71         72         73         74         75         76         77         78	7         7 <tr td=""> <!--</td--><td>21 21 21 21 21 21 21 21 21 21</td><td>22.45 26.12 19.45 20.61 17.66 34.12 30.38 20.04 13.60 24.30 24.37 18.45 27.86 19.95 28.45 27.49 23.49 21.09 15.92 10.64 15.92 10.64 15.92 10.64 15.44 23.93 14.15 24.40 16.08 23.46</td><td>0.37412 0.20179 0.55604 0.48316 0.67039 0.03515 0.08457 0.51851 0.88619 0.27897 0.27562 0.62039 0.14425 0.52435 0.12787 0.15517 0.31836 0.45330 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81	7	21	40.19	0.00705	
82	7	21	20.70	0.47726	
83	7	21	17.30	0.69276	
84	7	21	22.19	0.38853	
85	7	21	28.45	0.12796	
86	7	21	16.32	0.75160	
87	7	21	17.06	0.70768	
88	7	21	17.88	0.65676	
89	7	21	15.73	0.78454	
90	7	21	24.46	0.27126	
91	7	21	27.97	0.14097	
92	7	21	15.49	0.79749	
93	7	21	10.51	0.97150	
94	7	21	17.35	0.68991	
95	7	21	21.46	0.43104	
96	7	21	22.04	0.39701	
97	7	21	25.90	0.21018	
98	7	21	20.03	0.51922	
99	7	21	19.76	0.53662	
100	7	21	19.63	0.54476	
Combined P-va	alue for all tests	(Using KS meth	od)	0.99723	

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.

Test No.	Positions	DOF	ChiSqr	P-Value		
1	7	21	30.33	0.08559		
2	7	21	15.95	0.77234		
3	7	21	27.38	0.15875		
4	7	21	38.06	0.01270		
5	7	21	21.37	0.43668		
6	7	21	20.18	0.50963		
7	7	21	25.22	0.23759		
8	7	21	20.02	0.52025		
9	7	21	9.63	0.98331		
10	7	21	22.69	0.36063		
Combined P-v	0.86921					

# **3.2 Poker suits statistics for 36 cards deck:**

Notes:

1) Since the number of games played each month using 36 card decks is small, the number of samples available this month as well as a few previous months were insufficient to perform a meaningful statistical analysis. Hence the analysis performed this month was done using the cumulative data for the last 4 months - i.e Jan 2023 to Apr 2023.

# 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	0.69645	1.00000	
Suits Test	0.99723	1.00000	
Hand Types Test	0.93193	1.00000	
Combined P-Value using Holm's Method		1.00000	

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	0.98569	1.00000	
Suits Test	0.86921	1.00000	
Hand Types Test 1	<mark>0</mark> .75220	1.00000	
Hand Types Test 2	0.70330	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.

2) Since the number of games played each month using 36 card decks is small, the number of samples available this month as well as a few previous months were insufficient to perform a meaningful statistical analysis. Hence the analysis performed this month was done using the cumulative data for the last 4 months - i.e Jan 2023 to Apr 2023.

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 <u>Original</u> report.

Signed:

**Kiren Sreekumar Principal Consultant** iTech Labs Australia Date: 04 July 2023

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.



Signed:

Hump

**Gyulserian Hyussein** 

**iTech Labs Australia** 

**Senior Consultant** 

Date: 04 July 2023