



Blackjack Card Analysis

The Directors

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This is to confirm that [iTech Labs](http://www.itechlabs.com) has examined the game logs for Blackjack games for the period January 1, 2007 to May 31, 2007 as recorded by the respective game servers. iTech Labs has also analyzed the Blackjack cards for statistical randomness. The results of the analysis are given below.

URLs: www.888.com, www.casino-on-net.com, www.reefclubcasino.com, www.pacificpoker.com

The following tables compare the observed proportion of times the various types of events occurred (**Sample** column). **Probability** shows the theoretical values. **Lower** and **Upper** are the 95% confidence limits.

Actual and Theoretical probabilities for Blackjack, 20 and 10

Description	Probability	Lower	Sample	Upper
Dealer Blackjack	0.047566	0.047484	0.047634	0.047649
Player Blackjack	0.047566	0.047484	0.047619	0.047649
Dealer total 20 (from first 2 cards)	0.105537	0.105418	0.105580	0.105656
Player total 20 (from first 2 cards)	0.105537	0.105418	0.105607	0.105656
Dealer hole card is 10 value card (10-J-Q-K)	0.307692	0.307513	0.307813	0.307871

Calculations using live cards:

Notes:

- In the above table, all numbers in the Sample column (observed probabilities) lie within 95% confidence intervals. Chi-squared statistic is 6.86 on 4 df which is not significant with p-value=0.14
- Theoretical probability of 0.047566 for player blackjack means, players are likely to get blackjack in 4.76% of the total hands.

Actual and Theoretical probabilities for Ranks

Rank	Theoretical Probability	Lower	Sample	Upper
A	0.077	0.076875	0.0769445	0.076971
2	0.077	0.076875	0.0769079	0.076971
3	0.077	0.076875	0.0768938	0.076971
4	0.077	0.076875	0.0768916	0.076971
5	0.077	0.076875	0.0769355	0.076971
6	0.077	0.076875	0.0768960	0.076971
7	0.077	0.076875	0.0769519	0.076971
8	0.077	0.076875	0.0768790	0.076971
9	0.077	0.076875	0.0769288	0.076971
10	0.077	0.076875	0.0769700	0.076971
J	0.077	0.076875	0.0769366	0.076971
Q	0.077	0.076875	0.0769497	0.076971
K	0.077	0.076875	0.0769148	0.076971



Calculations using live cards:

Notes:

- a) In the above table, all numbers in the Sample column (observed probabilities) lie within 95% confidence intervals. Chi-squared statistic is 14.5 on 12 df which is not significant with p-value=0.27
- b) Theoretical probability of 0.077 means, there are 7.7 chances for any particular rank to occur in 100 cards.

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 probability calculations sufficient statistical power.

Conclusion: Calculations for blackjack, total 20 from first two cards and 10 value dealer hole card, indicated statistical randomness. Calculations for distribution of ranks also indicated statistical randomness. For both calculations, all observed probabilities were within 95% confidence limits of the theoretical probabilities. iTech Labs concludes that the Random Number Generator is operating correctly and the random numbers are being used in a fair manner.

The scope of the review did not include reviews of financial controls or casino operations. We believe that the probabilities were calculated correctly from the game logs.

Signed:

A handwritten signature in black ink, appearing to read "G. Y. Nicoll".

Geoff Nicoll
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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.

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