### Introduction:

The goal of this document is to explain the various statistical calculations made by PokerShowdown and link them back to proven statistic theorems.

### References:

Several probability terms, definitions, and theorems are taken from the following reference.

Probability and Statistics for Engineers and Scientists, Ninth Edition, Walpole, Myers, Ye

# Statistics from Showdown Table (bottom table)

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ilter by player name	PlayerName	Site Tim	nestamp	NG	ASHS	NS	NW	EXNW	LF1	NSO	NSOO	SOP	NBB	NBBC	BBP	AWEV	AAEV	AEXEV	SD	NSD	PC				
	***TOTALS***	DbS	itats 2	2570506	0.176	339204	43040.23	143082.07	8-0.00	26027	114710	22.689	26027	10169	3 25.594	10.778	105687.797	110892.10	9 94557.60	2-0.05	96.020				
umulative stats period	DunTakMaMony	PS AIL1	Time 3	305851	0.005	37266 1	5413.26	16290.961	-0.05	2239	10982	20.388	3561.5	12467	5 28.566	14.497	902652.000	947636.62	5 7244.479	-6.210	0.060				
All Time Y	EndlessSlump	WPN AIL1	Time 2	22671	0.567	6173 2	729.9592	3017.456	-0.09	543.5	2107.5	25.789	702	2181	32.187	6.577	195726.812	205714.40	6 35980.15	6-0.27	80.280				
ter by poker room	quade211	PS AIL1	Time 1	12508	0.158	1044 5	17.2596	419.607	0.233	36.5	166.5	21.922	82	397	20.655	10.509	14173.912	14067.065	545.832	0.196	88.090				
~	Altair Forna	PS AIL1		9919	0.137		79.04614		0.204		285	25.965	68	391	17.391		20655.508	21725.422	903.451	-1.18	25.080				
ter by game type		PS AIL1		8352	0.129		466.48697		0.058		330.5	19.818		330			24876.203	26442.455			17.760				
ter of game type	gayareta	PS AIL1		8013	0.106			508.296	0.054		479	22.756		366			21076.053	22320.281			14.760				
ter her her de				7898			42.91486			49.333332		22.910		313			23673.012	23132.029			58.280				
er by buyin		PS AII_1		7748				328.009	-0.04		274	21.898		268			23039.150	24682.621		_	17.760				
×		PS AII_1		7713			11.07483		0.185		161.5	25.697		223				22174.137			65.310				
ter by level				7339			63.43945		0.144		103	27.184		182		12.942	10209.526	9964.276	586.265		65.310				
				7018			180.53635			136.33333	-	24.639		270			38101.027	38456.254			80.280				
				6348			94.6346	196.412	-0.00		70			174			7154.408	7512.119	483.637		46.190				
Preflop allin games only		PS AIL1		5791			37.2864	755.647		247.5	1057.5			503			67616.375	71005.344		-	25.080				
Number at flop = Number at showdown	Tansu I			5774	0.210		56.26163		0.037		260			257			22215.141	22830.824			51.630				
Show all hands				5504			22.51602		0.110		279.5			212		7.588	23664.600	22204.627			25.080				
Upload scanned files	withoutform	PS AIL1	Time 5	5208	0.124	328 1	45.15376	127.700	0.137	10.5	60.5	17.355	15	97	15.464	12.594	5946.409	5998.932	504.397	-0.10	88.090				
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# 1) Expected EV (EXEV):

This calculation is straightforward. Each betting round (preflop, flop, turn, river) is treated independently since players contribute money to the pot while the probabilities are fixed. The amount of the contributed money each player is "expected" to win depends on only on the player's Expected Equity (EXEQ) that round. EXEV is calculated each round and depends only on the money contributed that round (not on the accumulated pot of money contributed in earlier rounds). The total EXEV for that game (all 4 rounds) is simply the sum of EXEV for all rounds.

Example: Preflop: PlayerA has 60% equity PlayerB has 40% equity 1000 goes into the pot (who bet or called does not matter) PlayerA EXEV for this round is 600 PlayerB EXEV for this round is 400

### Flop:

PlayerA has 80% equity PlayerB has 20% equity 4000 goes into the pot this round PlayerA EXEV for this round is 3200 PlayerB EXEV for this round is 800

No more bets on turn, river

PlayerA EXEV for this game is 3800 PlayerB EXEV for this game is 1200

Notes:

• PokerShowdown normalizes amounts by dividing by the big blind amount.

# 2) Actual EV (AEV):

Actual EV (AEV) is simply the amount of chips a player won that game.

Notes:

• PokerShowdown normalizes amounts by dividing by the big blind amount.

# 3) Standard Deviation (SD):

The calculation for SD is determined by Theorem 4.3 on page 142 of the reference.

The discrete random variable X is the number of chips won (or not won). Taking the example from Section 1 above, for PlayerA the 2 outcomes for X are to win 0 or win 5000.

Assume the big blind amount is 100 to normalize amounts:

X	EXEV	(X -EXEV)^2	Probability: f(X)	f(X)*((X-EXEV)^2)
0	38	1444	0.24	346.56
50	38	144	0.76	109.44
VAR				456
SD				21.35

Note: since Expected Equity (EXEQ) is used in previous calculations outcomes like ties/split pots are accounted for in EXEQ and EXEV values.

### 4) Number Standard Deviations (NSD):

The Number of Standard Deviations (NSD) is simply the number of SD the actual result (AEV) is from the expected result (EXEV).

From the example in Section 1, if Player A won: AEV = 50EXEV = 38SD = 21.35

NSD = abs(AEV-EXEV)/SDNSD = abs(50-38)/21.35 = 0.56

If PlayerA lost: AEV = 0EXEV = 38SD = 21.35

NSD = abs(AEV-EXEV)/SDNSD = abs(0-38)/21.35 = 1.78

### 👸 PokerShowdown v24.2.1.0 - SQLite - Full Version Scan Settings Database Help Filter by player name Site Timestamp NG PlayerName ASHS NS NW EXNW LF1 NSO NSOO SOP NBB NBBO BBP AWE / AAEV AEXEV SD NSD PC \*TOTALS\*\* DbStats 2570506 0.176 339204 143040.23 143082.07 114710 22.689 26027 101693 25.594 105687.797 110892.109 94557.6 96.020 305851 Cumulative stats period DunTakMaMony PS All\_Time 37266 15413.26 16290.961 10982 20.388 3561.5 12467.5 28.566 14.40 567 6173 2729.9592 3017.456 95726.812 205714.406 35980.1 All\_Time EndlessSlump WPN All\_Time 22671 543.5 2107.5 25.789 702 2181 32.187 0.280 PS All\_Time 12508 1044 517.2596 419.607 166.5 21.922 82 397 20.655 14173.912 14067.065 545.832 88.090 quade211 ilter by poker room Altair Form PS All\_Time 9919 1257 579.04614 481.056 25,965 68 391 17.391 20655.508 21725.422 903.451 0.137 285 080 0.129 1130 466.48697 441.117 17.760 PS All\_Time 19.818 76 330 24876.203 26442.455 1160.816 Tonecas 8352 23.030 Filter by game type PS 14.760 All\_Time 8013 363 535.6148 508.296 22.756 77 366 21.038 076.053 22320.281 874.415 gayareta scott freeee PS All\_Time PS All\_Time 7898 964 442,91486 372,576 215,33333 22,910 63 313 20.128 23673.012 23132.029 1049.923 58,280 0.152 Filter by buyin 7748 0.174 800 314.1095 328.009 21.898 72 26.866 3039.150 24682.621 1212.88 17.760 Lassahn74 All\_Time 268 PS All\_Time 311.0748 25.697 47 223 2710.225 22174.137 1158.52 Pourquoi5 653 262.502 161 5 21.076 ilter by leve dama 53200 PS All\_Time 545 263.43945 230.376 27.184 32 182 17.582 0209.526 9964.276 586.265 65.310 7339 7018 1248 480.53635 461.604 24.639 59 21.852 101.027 38456.254 1612.140 All\_Time Rozinha.D PS All\_Time funny22 6348 460 194,6346 196,412 20.000 36 174 20.690 7154.408 7512.119 483.637 46,190 Preflop allin games only curios@69 PS All\_Time 5791 2095 737.2864 755.647 23.404 145 503 28.827 .744 67616.375 71005.344 2900.379 5.080 PS All\_Time 5774 831 356.26163 343.580 21.154 62 257 24.125 0.641 2215.141 22830.824 1019.02 1.630 Number at flop = Number at showdown POKAURFACE PS All\_Time withoutform PS All\_Time 5504 322,51602 90.627 279.5 28.086 57 212 26,887 3664.600 22204.627 1261.327 25.080 Show all hands 97 15.464 12.594 5946.409 5998.932 504.397 0.124 328 17.355 15 5208 145.15376 127.700 60.5 38.090 Upload scanned files Autoscan enabled folders (1 scan/min) Player Name Site Timestamp Game Type Tournament ID BuyIn Hole Cards SHS EV\_PreFlop EV\_Flop EV\_Turn EV\_River WEV AEV SD Game ID Level EXEQ Board Win Pot EXEV DunTakMaMony PS 3/30/2025 8:19:01 PM 255525951842 Tournament 3871165416 10000000 Unknov n 7000/3500 4d Ad 32.01225 Ks 9c 5c Jd 8d 0 90146 4.12253766.007 2.846 DunTakMaMony PS 3/30/2025 8:16:45 PM 255525928513 Tournament 3871161500 2500000 Unknown 12000/6000 Qd Jd 50.42075 3c 3d 7d 3h Ad 0 591674 24.172258 24.64839 5.556 DunTakMaMony PS 3/30/2025 8:15:17 PM 255525913417 Tournament 3871161500 2500000 Unknown 10000/5000 2d 3c -0.8742515 32.567757 3d 7h 4c 8d Js 1 63750 3.520959 3.17000 DunTakMaMony PS 3/30/2025 8:14:16 PM 255525903038 Tournament 3871161500 2500000 Unknown 10000/5000 3h Jh -0.8742515 56.281567 7d Ac 5d 3s Ad 1 2.239 4.699 4.6500077 3.55966 73750 DunTakMaMony PS 3/30/2025 8:13:56 PM 255525899639 Tournament 3871161500 0.8742515 59.446804 As Kc 8h Ac Os 0.5 23750 1.4118617 1.166112 2500000 Unkno wn 10000/5000 6s Jh 0.912 1875 DunTakMaMony PS 3/30/2025 8:12:30 PM 255525885002 Tournament 3871161500 2500000 Unknown 10000/5000 Ah 6c -0.8742515 27.620825 9h Th Ad Tc 3d 0 8262 14.172731 31.14659 28775 38.207687 25.5458 DunTakMaMony PS 3/30/2025 8:08:45 PM 255525846283 Tournament 3871161500 2500000 Unknown 8000/4000 Ad Ac 86.69308 6h 6c Qh 7d 3c 1 4423 DunTakMaMony PS 3/30/2025 8:06:46 PM 255525825603 ournament 3871161500 500000 Unkr 0.8742515 30.11098 Tc Oc 6h 2h 7d 0 56000 400299 3.32274 8000/4000 Jc 6c 1.379 DunTakMaMony PS 3/30/2025 8:04:13 PM 255525798231 Tournament 3871161500 .668045 13.3751 2500000 Unknown 8000/4000 Ad Js 24.737225 4d 4s 2h 4c 3h 0 24798 DunTakMaMony PS 3/30/2025 8:03:23 PM 255525789320 Tournament 3871165416 0000000 Unkno 42.118484 Qd Kh 4s Kc 8d 1 6275 6.7396965 6.72856 DunTakMaMony PS 3/30/2025 7:53:18 PM 255525696022 DunTakMaMony PS 3/30/2025 7:51:09 PM 255525672631 ournament 3871161500 15.368 27.885 2500000 Unknown 7000/3500 Tc Td 68.6358269c 9d 2c 8s 3d 1 3212 45.896572 8.778883 22.19522 ournament 3871161500 69.059 Qs 5s 4s Jc 3d 1.696457 23.67548 500000 Unknown 7000/3500 Qh Kc 2.539143 ournament 3871161500 DunTakMaMony PS 3/30/2025 7:50:00 PM 25552566012 4h lh -0.8742515 23.479406 Ks Tc 6d Os 3d 0 1 1152718 2 013382 500000 Unk 7000/3500 33250 DunTakMaMony PS 3/30/2025 7:47:32 PM 255525632785 Tournament 3871165416 10000000 Unknown 3200/1600 8h 8s 53.94156 As Jh 7d 8d 7h 1 64994 310625 10.955868 10.123709 DunTakMaMony PS 3/30/2025 7:45:19 PM 255525607735 Tournament 3871165416 c 7d 2c 9d 6h 0 0000000 Unknow Ad 3

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### Statistics from Cumulative Stats Table (top table)

# 5) Average Expected EV (AEXEV):

This is not an average but instead the sum of EXEV amounts over the specified period. This is the expected/mean outcome of all games over the specified period. This can be thought of as the mean amount of chips the player should have won over the specified period.

Note: The original idea was for this to the average per showdown (divided by NS). However, to make other calculations straightforward this is simply a sum.

### 6) Average Actual EV (AAEV):

Similar to above, this is the sum of AEV amounts over the specified period. This is the actual outcome of all games over the specified period.

# 7) Standard Deviation (SD):

The calculation for the total variance (and hence SD) is taken from Corollary 4.11, page 153.

Since the random variable for each game is independent: X1, X2, X3, etc

The variance the total distribution Z = X1 + X2 + X3...

is simply the sum of the variances of each independent distribution.

VAR = VAR1 + VAR2 + VAR3...

And SD is the square root of VAR.

### 8) Number Standard Deviations (NSD):

The Number of Standard Deviations (NSD) is simply the number of SD the average actual result (AAEV) is from the average expected result (AEXEV).

```
NSD = abs(AAEV-AEXEV)/SD
```

### 9) Percent Confidence (PC):

Percent Confidence comes from the table in appendix table A.3 in the reference.

This is consistent with the 68-95-99.7 rule which states that 68% of outcomes are within 1 SD, 95% of outcomes are within 2 SD, and 99.7% of outcomes are within 3 SD.

### Additional Notes:

A couple options were added to eliminate a possible bias in the data.

With showdowns, not all cards that affect the outcome may be known. For example, for a showdown between 2 players, if 4 players saw the flop, the preflop probabilities were not distributed among only the 2 showdown players. The 2 remaining players are likely those that connected best with the flop. The "Number at flop = Number at showdown" is intended to eliminate this bias by only calculating stats for games where the players at showdown were the only players to see the flop.

Similarly, the "Preflop allin games only" option will only calculate stats for games where players were allin preflop (at most 1 player may not be allin). This guarantees no post flop action that could introduce a bias.

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lter by player name	PlayerName	Site 1	Timestamp	NG	ASHS	NS	NW	EXNW	LF1	NSO	NSOO	SOP	NBB	NBBO	BBP	AWEV	AAEV	AEXEV	SD	NSD	PC				_
	***TOTALS***	D	bStats	2570506	0.176	339204	143040.23	143082.078	-0.000	26027	114710	22.689	26027	101693	25.594	10.778	105687.797	110892.10	994557.6	02-0.05	96.020				
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All Time Y	EndlessSlump	WPN A	All_Time	22671	0.567	6173	2729.9592	3017.456	-0.095	543.5	2107.5	25.789	702	2181	32.187	6.577	195726.812	205714.40	06 35980.1	56 <mark>-0.27</mark>	80.280				
lter by poker room	quade211	PS A	All_Time	12508	0.158		517.2596	419.607	0.233	36.5	166.5	21.922	82	397	20.655	10.509	14173.912	14067.065		0.196	88.090				
~	Altair Forna		All_Time	9919	0.137		579.04614		0.204		285	25.965		391				21725.422			4 25.080				
ter by game type	Tonecas			8352	0.129		466.48697		0.058		330.5	19.818		330			24876.203	26442.455			9 17.760				
·····	gayareta			8013				508.296	0.054		479	22.756		366				22320.281	_	_	3 14.760				
ter by buyin	scott freeee		All_Time	7898	0.152		442.91486		_	49.333332		22.910		313				23132.029		_	58.280				
ter by buyin	Lassahn74		All_Time	7748	0.174		314.1095	328.009	-0.042	~~	274	21.898		268				24682.621			5 17.760				
V New Journal	Pourquoi52		All_Time	7713	0.151		311.07483		0.185		161.5			223				22174.137			65.310				
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Number at flop = Number at showdown	Tansu I POKAURFACE			5504	0.210		320.20103		0.037		200			257 212			22215.141	22830.824			4 51.630 25.080				
Show all hands	withoutform			5504 5208	0.195		322.51602 145.15376		0.110		279.5 60.5	17.355		212 97				5998.932	504.397		4 88.090				
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0unTakMaMony PS 3/30/2025 7:50:00 PM					500000					0.8742515		-			250 1.2		0.000			0.615	0	1,1152718 2,01338		58.280003	3
, , , , , , , , , , , , , , , , , , , ,	255525632785 Tou						wn 3200/1			5		As Jh 7c			994 0.3		0.000	0.000			20.310625	10.955868 10.1237			-
OunTakMaMony PS 3/30/2025 7:45:19 PM			_				wn 2800/1			0.8742515					074 -0.		0.000			2.937		5.9516706 9.15250		51.63	+
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DunTakMaMony PS 3/30/2025 7:39:03 PM	100						0000/1								0.0							2011 201 201 200			
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