Three hands, seventeen cards

Set aside **2♣ as I**, the invariant marker. Deal the other 51 cards into three ordered hands of 17. Below is the tested starting deal (shuffle seed 3). Read each column downward; the first row is played first.

	PLAYER 1	PLAYER 2	PLAYER 3
01	7♣	10♦	4♠
02	5♦	A♣	10♠
03	6♠	J♦	3♣
04	2♦	7♥	8♦
05	9♠	K♥	4♦
06	6♣	3♦	A♥
07	5♣	2♥	A♦
08	6♦	Q♥	J♥
09	10♣	8♥	9♥
10	3♠	J♠	8♠
11	6♥	7♦	9♦
12	J♣	4♥	4♣
13	Q♦	5♥	Q♣
14	A♠	K♣	2♠
15	K♠	Q♠	8♣
16	K♦	7♠	3♥
17	9♣	10♥	5♠

Play. Every nonempty hand reveals its top card. Higher rank wins: A=1, J=11, Q=12, K=13. Equal ranks use ♠ < ♥ < ♦ < ♣. The winner puts its own revealed card on the bottom first, then the other revealed cards in clockwise player order. Repeat; captured cards return to play.

A player with no cards is out. With two players, the same rule continues. Keep I outside the contest. Log the full ordered hands if you want to distinguish a long game from an exact repeat.

This is a specified War variant. Suit tie-breaking and the return order are part of the rule. No grouping is assumed optimal.

One swap changes the continuation

The starting deck encodes 14.134725141735. Swap its final two active cards before applying the same shuffle; it then encodes 14.134725141734. Card inventory and assigned total score are unchanged.

Observed item	Original arrangement	After one swap
First player out	P1 at turn 86	P3 at turn 83
Continuation	P2 wins at turn 144	Exact cycle
Cycle certificate	Not needed	State 1015 = state 1535
Cycle period	-	520 turns

A closed tail for this game. A repeated full state, together with this deterministic rule, forces every later turn to repeat. A repeated card count alone is insufficient: the order within each hand is part of the state.

Across 64 matched shuffles (128 runs), we found **15 finishes and 113 exact cycles**. Finishes took 55 to 151 turns; cycle periods ranged from 312 to 4,004. The one-swap pairs differed in observed stopping time in 63 of 64 cases, and in finish-versus-cycle outcome in 7.

Which null? A separate matched test replaced A♣ with 2♣ at the same hand position, thereby changing the excluded marker from 2♣ to A♣. Each choice gave 6 finishes and 58 cycles. Seven durations changed; no finish-versus-cycle outcome changed. This sample gives no termination advantage to either face.

Turn n is logged beside the stored height y_n, through the available 1,566 records. Height values do not enter this winning rule. Their labels can move without moving the game; changing the encoded input arrangement can change the game.

The square relation is exact

After the first elimination, before any escrow, two players hold a and b active cards. Their sum is 51. The reserved marker I contributes one physical card and zero playable cards. Test assigning it to either hand in a separate physical-count ledger.

$S = a+b = 51$ **$D = a-b$** **$Q = a^2+b^2$**

$2Q = S^2+D^2$ **With I: S becomes 52; D becomes D±1**

The original run first reaches two players with **39 and 12** cards. The difference is 27. The two marker placements give:

Ledger	Physical counts	Difference	Square sum
I with larger hand	40, 12	28	1,744
I with smaller hand	39, 13	26	1,690

If the objective is the smallest physical count imbalance or square sum, assigning I to the smaller hand is always best. The result follows from comparing increments 2a+1 and 2b+1. It is identical for an ace marker or a two marker.

What the real game does. In a two-player turn, the winner gains one net card and the loser loses one. The square sum changes by 2(winner count - loser count)+2. In the two logged runs, it increased 767 times, decreased 742 times, and stayed equal once. It is a checked measurement, not a quantity that always rises.

The reusable work of I. The shared convention checks the boundary and keeps 51 active cards distinct from 52 physical cards. It needs no new symbol each turn. Predicting a continuation additionally uses the ordered hands and the transition rule.

A rule that makes progress

The players compete with each other. I belongs to the table's accounting and an optional intervention rule. Ordinary War has no choices after the shuffle; the holder of I chooses whether a detected loop is left intact or interrupted.

Forgive an exact repeat. Each live player puts its top card under I, permanently outside further contests. Begin a fresh recurrence ledger and continue with the same contest rule. Repeat this intervention whenever another full state repeats.

The invariant account is now **cards in hands + cards under I = 51**. Including the marker makes 52 physical cards. The circulating count strictly decreases at each intervention; the preserved total includes escrow.

Why it terminates. A finite deterministic phase must finish or repeat. At every repeat the intervention removes at least two circulating cards. There can be at most 25 interventions. Eventually one live hand remains, or all remaining cards enter escrow. The survivor may collect escrow; an empty table is a draw.

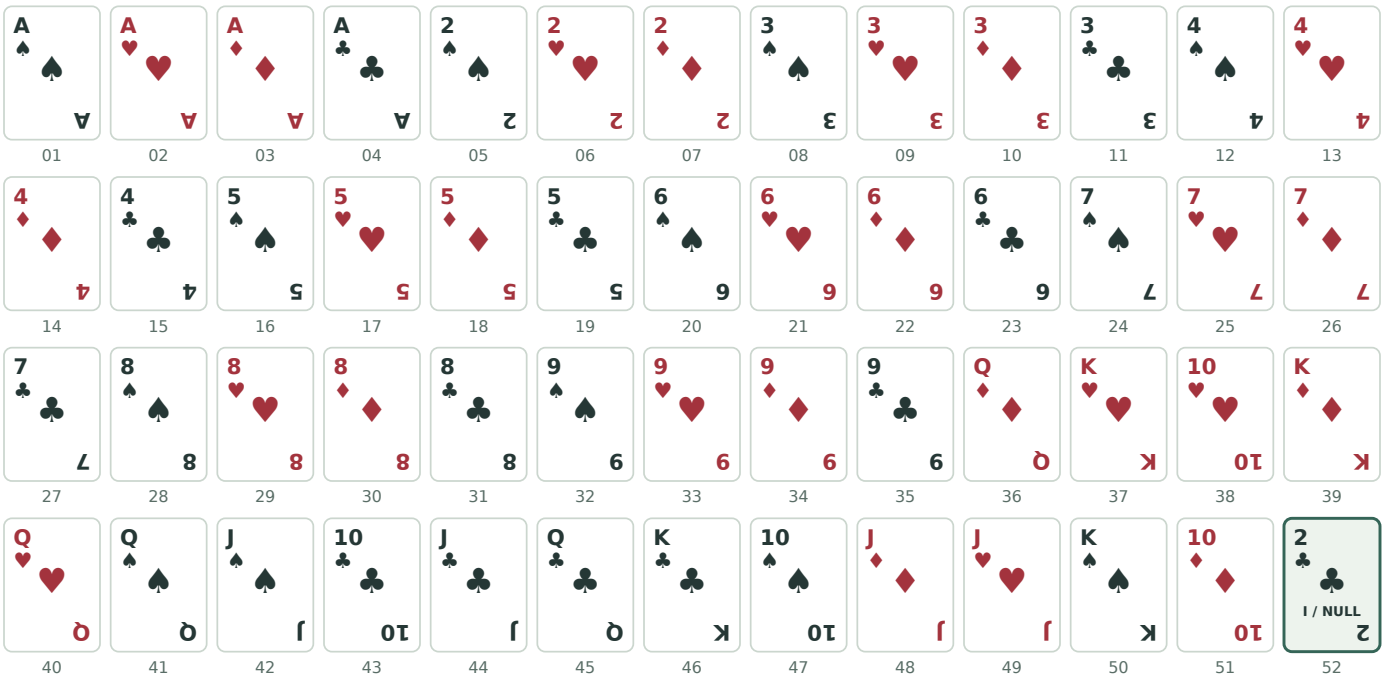
Tested 128 starts	Hold I	Forgive every repeat
Finishes	15	128
Certified loops	113	0
Observed interventions	0	0 to 24

The swapped example finishes at turn **12,048** after 12 interventions, with 27 cards in P2's hand and 24 in escrow. Its ordinary version cycles forever. Withholding forgiveness preserves that detected cycle; some other starting deals finish normally.

This is a proved rule for this finite model. Generous tit-for-tat in the Prisoner's Dilemma concerns a different payoff game. Here the strict decrease supplies the termination proof; applying such a claim to zeros would require a corresponding proved rule.

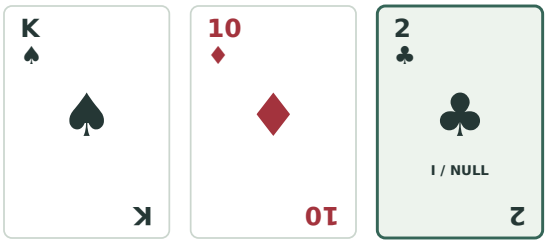
A number in your hands

Use an ordinary 52-card pack, with no jokers. Keep the **2 of clubs** as the null at the bottom. Arrange the cards below: read each row left to right, then downward. Card 01 is on top.

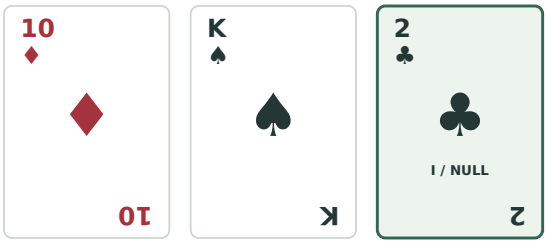


Now swap cards **50 and 51**. Leave card 52, the null, where it is.

BEFORE: LAST THREE CARDS



AFTER: LAST THREE CARDS



The card count, suit counts, one-card frequencies, and total assigned score remain the same. The null is still fixed. What did the swap change?

Turn the page to read the number and the rule.

OPEN THE CONVENTION

The number changed

BEFORE

14.134725141735

AFTER THE SWAP

14.134725141734

This is the first stored zero ordinate, at 12 decimal places. The swap lowers that stored value by exactly 0.000000000001. It changes a decimal record; it is not a claim that the exact zeta zero moved.

The suit gives a residue mod 4

♠ **Spades** residue 0	♥ **Hearts** residue 1	♦ **Diamonds** residue 2	♣ **Clubs** residue 3

Ranks have values A=1, 2 through 10, J=11, Q=12, K=13. Suits have s=0 through 3. The card address is **q=4(v-1)+s**. The null 2 of clubs has q=7, while its fixed deck position is 52.

Read an order, not a bag

Use the active reference order A-spades, A-hearts, A-diamonds, A-clubs, then 2-spades, 2-hearts, 2-diamonds, then the threes, and so on. Omit the null. At each position, count the still-unused reference cards that precede the chosen card.

Deck rank = sum of d_i times (51-i)!

Stored height = deck rank / 1,000,000,000,000

Here the rank is 14,134,725,141,735. Swapping the final two active cards changes only the last binary choice and subtracts one. The calculation trace is included with the source files.

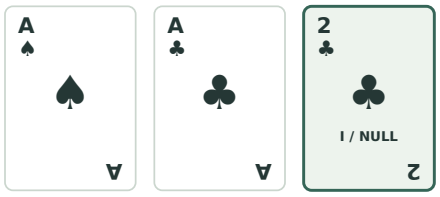
A fixed null checks the frame boundary. Moving it away from the bottom makes the deck invalid under this mode. A valid rearrangement of the other 51 cards carries a different rank.

51 components, one null

The active cards are ranked by expected contribution to the known symbol budget. L means leading component, V vowel, and T trailing. I is an inventory contribution in bits per complete symbol, not a hand value to add while decoding. The null is an unranked control.

q	Card	Tile	Code	I	q	Card	Tile	Code	I	q	Card	Tile	Code	I
0	A♠	L0	U+1100	0.527554	18	5♦	T5	U+11AC	0.172807	35	9♣	T11	U+11B2	0.170497
1	A♥	L1	U+1101	0.527554	19	5♣	T6	U+11AD	0.172807	36	10♠	T12	U+11B3	0.170497
2	A♦	L2	U+1102	0.447554	20	6♠	T7	U+11AE	0.172807	37	10♥	T13	U+11B4	0.170497
3	A♣	V0	U+1161	0.233866	21	6♥	T8	U+11AF	0.172807	38	10♦	T14	U+11B5	0.170497
4	2♠	V1	U+1162	0.233866	22	6♦	T9	U+11B0	0.172807	39	10♣	T15	U+11B6	0.170497
5	2♥	V2	U+1163	0.233866	23	6♣	V10	U+116B	0.171050	40	J♠	T16	U+11B7	0.170497
6	2♦	V3	U+1164	0.233866	24	7♠	V11	U+116C	0.171050	41	J♥	T17	U+11B8	0.170497
8	3♠	V4	U+1165	0.233866	25	7♥	V12	U+116D	0.171050	42	J♦	T18	U+11B9	0.170497
9	3♥	V5	U+1166	0.233866	26	7♦	V13	U+116E	0.171050	43	J♣	T19	U+11BA	0.170497
10	3♦	V6	U+1167	0.233866	27	7♣	V14	U+116F	0.171050	44	Q♠	T20	U+11BB	0.170497
11	3♣	V7	U+1168	0.233866	28	8♠	V15	U+1170	0.171050	45	Q♥	T21	U+11BC	0.170497
12	4♠	V8	U+1169	0.233866	29	8♥	V16	U+1171	0.171050	46	Q♦	T22	U+11BD	0.170497
13	4♥	V9	U+116A	0.203814	30	8♦	V17	U+1172	0.171050	47	Q♣	T23	U+11BE	0.170497
14	4♦	T1	U+11A8	0.172807	31	8♣	V18	U+1173	0.171050	48	K♠	T24	U+11BF	0.170497
15	4♣	T2	U+11A9	0.172807	32	9♠	V19	U+1174	0.171050	49	K♥	T25	U+11C0	0.170497
16	5♠	T3	U+11AA	0.172807	33	9♥	V20	U+1175	0.171050	50	K♦	T26	U+11C1	0.170497
17	5♥	T4	U+11AB	0.172807	34	9♦	T10	U+11B1	0.170497	51	K♣	T27	U+11C2	0.170497

2♣ / q=7 / I: the expected ending contribution is 0.172807 bits. It completes the ledger: 10.317041 + 0.172807 = 10.489848 bits per complete symbol.



Three cards make one symbol.
A♠ / A♣ / 2♣ reads radix digit zero. The null here means the trailing component is absent. Its occurrence can vary in data hands; its position stays fixed only in full-deck frames. Return cards before dealing the next hand.

What this demonstration carries

The card versions recover the original decimal files exactly. A three-card hand represents one encoded symbol; a full-deck frame uses the order of all 51 active cards, with the null fixed at the bottom.

Measured item	Original prefix	Latest file
Zero records	1,438	1,566
Decimal source bytes	25,206	27,510
Packed byte payload	7,571	8,239
Three-card hands	5,775	6,284
Full-deck frames	277	301

One frame has 51! possible orders: about **219.88 bits** of capacity. The full latest file needs 301 ordered arrangements in this format. You may reuse one physical pack, but the sequence of deals must be retained. A bag of the cards alone does not retain the data.

Where it fits in v7.2

Section 3 - shared convention
The card key and decoder make the same records readable in another medium.

Section 6 - the fiber criterion
The inventory and summed score stay fixed while a decoded number changes.

Section 7 - different measurements
Histogram entropy, order capacity, and zero-state entropy measure different objects.

Section 8 - finite continuation
A repeated full state certifies the game; forgiveness adds strict progress.

The full ordered state and a fixed rule certify a periodic future for a repeating card game. The zero-height labels are external to that rule. A connection constraining unobserved zeros would require an additional proved relation.