

Program Description I

Program Title BLACKJACK GAME

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Program Description, Equations, Variables This program operates as a Blackjack dealer. (System players will find that their systems don't work since cards are dealt from an infinite deck.) The subroutine which deals cards produces integers randomly from 1 to 13 inclusive in an even distribution. The integers 11, 12, and 13 are then converted to 10. Any Ace (1) dealt is set to 11 points if possible (total < 21) and a flag set to indicate that the player (or dealer) is "SOFT." Four cards are dealt initially with the player's total and the dealer's second card ("up" card) shown in the following format:

PP. DD where PP is the player's total and DD is the dealer's second card (dealer's total after "STICK" or Blackjack). If the player is "SOFT" then the exponent position of the display will show 00. The current Bankroll figures into the random number generator to give plenty of variety (difficult to memorize sequences). The player wins 1.5 x his bet if he has a Blackjack (and the dealer does not have a Blackjack).

Operating Limits and Warnings Attempts to gamble on credit (bet more than the current Bankroll) will cause the program to halt with "Error" displayed. This will also occur doubling down causes a valid bet to become invalid. The program must be restarted following this (new Bankroll, [A]).

Compute Times: Initial deal (4 cards) is approximately 14 seconds.
To deal one card (HIT) is approximately 4 seconds.

This program has been verified only with respect to the numerical example given in Program Description II. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

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Program Description II

Sketch(es)

Sample Problem(s) Start with Registers cleared (f, CL REG).

Enter \$5000 and push "START" (A).

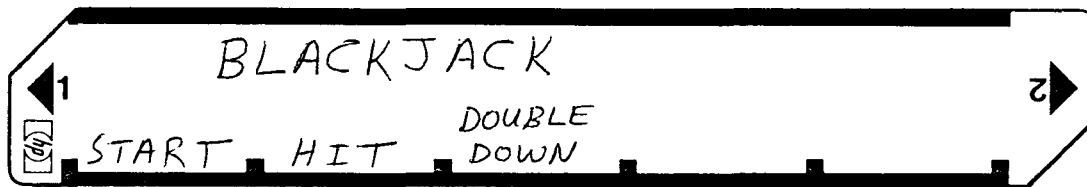
1. Bet \$50 and push [R/S]. The program pauses to display 7.21 (dealer has Blackjack, player has a 2-card total of 7, dealer automatically wins). Display blinks off 3 times then the program subtracts your bet from your Bankroll then halts showing new Bankroll of \$4950.

2. Bet another \$50 and push [R/S]. The program halts (after ~14 sec.) to display 16.03 (tough decision!) Go ahead and "HIT" it. [B]. See displayed 20.03 (Lucky! better "STICK"). To stick, push [R/S]. The following sequence of displays occurs: 20.14 (dealer had Ace in the hole), 20.12 (got to 22 so took Ace to 1), 20.16, 20.22 (Win!!), \$5000.

3. Bet another \$50 and push [R/S]. The program halts to display 17.08 00 (you have an Ace and a 6). So take a hit, [B]. Displays 17.08 (got a 10, reduced Ace to 1). Better stick, [R/S]. Display sequence is: 17.15 (dealer had a 7 in the hole), 17.23 (dealer got an 8 and busted), You Win!!, \$5050.

Reference(s) HP-65 library program # 1296A by Gary D. Campbell.

I must give Gary (who I know personally) credit for the random generator and the display format (except for using the exponent to indicate a soft hand).



STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1.	Load Program Card (Both sides)		☐ ☐	
2.	Enter "Bankroll" (Total amount of money to be risked)	\$	☐ A	Bankroll
3.	Place a bet (no credit allowed) and deal a hand (2 cards to player and 2 to dealer) Note: see program description for meaning of PP. DD	\$	☐ R/S	PP. DD
4.	Player may wish to get "HIT" (take another card) If player's total exceeds 21 then		☐ B	PP. DD ↓ new Bankroll
5.	Repeat step 4 as desired.		☐ ☐	
6.	Player may "DOUBLE DOWN" if his 2-card total is 10 or 11 (doubles bet and takes 1 card) Play automatically continues until win or lose		☐ C	PP. DD ↓ new Bankroll
7.	Player may "STICK" when satisfied with his total. The dealer then takes cards until he breaks (over 21) or exceeds 16 (17 if he is soft). The program pauses to show totals after each card dealt. Dealer wins if his total is higher than the player's total and he did not exceed 21. All ties cancel the bet (neither win nor lose). Player wins if his total is higher than the dealer's total and he did not exceed 21.		☐ R/S	PP. DD ↓ PP. DD ↓ ↓ ↓ new Bankroll
8.	Return to step 3 for a new hand. Note: Blackjack (21 with 2 cards) causes display to flash. If it is for the player, he wins 1.5 x his Bet.		☐ ☐	

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBL A	31 25 11	Initialize for new hand	57	*LBL 5	31 25 05	Deal next card for the dealer
2	2	02		58	GSB 8	31 22 08	
3	1	01		59	STO 3	33 03	
4	STO 0	33 00		060	*LBL 0	31 25 00	Here to set dealer's 1st card
5	x=y	35 52		61	RCL 3	34 03	} Set dealer total
6	STO 5	33 05	Save Bankroll	62	STO+1	33 61 01	
7	FIX	31 23		63	RCL 0	34 00	} dealer "soft"? (Ace=11)
8	DSP 0	23 00		64	RCL 1	34 01	
9	SF 0	35 51 00	} initially there are no Aces.	65	FI?	35 71 01	Yes - dealer > 21?
010	CF 1	35 61 01		66	x=y?	32 71	
11	R/S	84	Stop to enter Bet.	67	GTO 3	22 03	Neither - go on
12	STO 4	33 04	Save Bet	68	RCL 8	34 08	} dealer was soft and > 21 so reduce the Ace to 1.
13	GSB 6	32 22 12	Check for attempt to get credit	69	STO-1	33 51 01	
14	CL x	44	} initialize player total and # of cards.	070	CF 1	35 61 01	Format display Pause to show totals
15	STO 2	33 02		71	*LBL 3	31 25 03	
16	STO 6	33 06		72	GSB 6	31 22 06	} Player broke? (>21)
17	GSB 9	31 22 09	Deal to player	73	PAUSE	35 72	
18	GSB 8	31 22 08	Deal to dealer	74	RCL 0	34 00	Yes - go lose
19	STO 3	33 03	Save dealer's 1st card	75	RCL 2	34 02	
020	GSB 9	31 22 09	Deal to player	76	x>y?	32 81	No } Dealer broke? (>21)
21	GSB 8	31 22 08	Deal to dealer	77	GTO 2	22 02	
22	STO 1	33 01	Save dealer's "up" card	78	x=y	35 52	Yes - player wins
23	RCL 3	34 03	} Dealer total = 21? (Blackjack)	79	RCL 1	34 01	
24	+	61		080	x>y?	32 81	No } Dealer ≤ 16?
25	RCL 0	34 00	No	81	GTO 4	22 04	
26	x=y?	32 61	Yes - save dealer's total	82	5	05	Yes - get next card
27	GTO 0	22 00	Go flush display	83	+	61	
28	STO 1	33 01	} Did player total also = 21?	84	x=y?	32 71	No } Dealer soft and = 17?
29	GSB 4	32 22 14		85	GTO 5	22 05	
030	RCL 0	34 00	Yes - Tie	86	1	01	No } Dealer soft and = 17?
31	RCL 2	34 02	No - go lose	87	-	51	
32	x=y?	32 51	here for dealer ≠ 21	88	FI?	35 71 01	Yes - No win or lose
33	GTO 0	22 31 13	} Player = 21?	89	x=y?	32 61	
34	GTO 2	22 02		090	GTO 0	22 00	Player > Dealer?
35	*LBL 0	31 25 00	No	91	GTO 5	22 05	
36	RCL 2	34 02	Yes - set dealer's total	92	*LBL 0	31 25 00	Yes - Player wins
37	x=y?	32 61	Go flash display	93	RCL 1	34 01	
38	GTO 1	22 01	} increase bet by factor of 1.5	94	RCL 2	34 02	Here for Lose
39	RCL 3	34 03		95	x=y?	32 51	
040	STO+1	33 61 01	Go win	96	GTO 0	22 31 13	change bet to negative value
41	GSB 4	32 22 14	Here for a HIT	97	x>y?	32 81	
42	1	01	Deal to player	98	GTO 4	22 04	Win Label - here for win, lose, or draw.
43	.	83	} Break? (>21)	99	*LBL 2	31 25 02	
44	5	05		100	RCL 4	34 04	Set new Bankroll
45	STO x 4	33 71 04	Yes - go display & lose	101	CHS	42	
46	GTO 4	22 04	No - also no Blackjacks	102	STO 4	33 04	Back to Start
47	*LBL B	31 25 12	Format display	103	*LBL 4	31 25 04	
48	GSB 9	31 22 09	Stop for decision	104	RCL 4	34 04	Tie,
49	RCL 0	34 00	} "STICK"	105	RCL 5	34 05	
050	RCL 2	34 02		106	+	61	clear Bet
51	x>y?	32 81		107	GTO A	22 11	
52	GTO 3	22 03		108	*LBL C	32 25 13	Here for "DOUBLE DOWN"
53	*LBL 1	31 25 01		109	0	00	
54	GSB 6	31 22 06		110	STO 4	33 04	
55	R/S	84		111	GTO 4	22 04	
56	GTO 0	22 00		112	*LBL C	31 25 13	

REGISTERS

0	21	1 Dealer's Total	2 Player's Total	3 Dealer's first card	4 Bet	5 Bank-Roll	6 # of cards dealt to Player	7 Random # Seed	8 10	9
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9	
A	B	C	D	E	I					

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
113	RCL 2	34 02	} Player = 10?	169	1	01	} is it an Ace?
114	RCL 8	34 08		170	XZY	35 52	
115	X=Y?	32 51		171	X=Y?	32 51	
116	GTO 0	22 00	Yes - OK, so far	172	FI?	35 71 01	Yes - already SOFT?
117	1	01	No	173	RTN	35 22	SOFT, or no Ace, done
118	+	61	} Player = 11?	174	RCL 8	34 08	} is an Ace, not SOFT, so add 10 and set SOFT indication
119	X≠Y?	32 61		175	+	61	
120	GTO 1	22 01		176	SF 1	35 51 01	
121	*LBL 0	31 25 00	No-disallow doubling	177	RTN	35 22	Done
122	RCL 6	34 06	Yes - OK, so far	178	*LBL 7	31 25 07	Deal one card routine
123	2	02	} Does player have 2 cards?	179	1	01	} Establish 10 for many uses
124	X≠Y?	32 61		180	0	00	
125	GTO 1	22 01		No-disallow doubling	181	STO 8	33 08
126	STO X 4	33 71 04	OK, double bet	182	RCL 7	34 07	
127	GSB 6	32 22 12	Check for credit try	183	RCL 5	34 05	} Get current Bankroll
128	GSB 9	31 22 09	Deal 1 card to player	184	RCL 5	34 05	
129	GTO 3	22 03	Go display & pause (stick)	185	X	71	
130	*LBL 6	31 25 06	Format display routine	186	+	61	
131	RCL 1	34 01	} Dealer total → .DD	187	+	61	
132	EEX	43		188	LN	31 52	
133	2	02		189	RCL 7	34 07	
134	÷	81	} Add player total → PP, DD	190	+	61	} Set new seed
135	RCL 2	34 02		191	X ²	32 54	
136	+	61		192	FRAC	32 83	} Form card value $1 \leq C \leq 13$
137	DSP 2	23 02	} Set FIX 2 display	193	STO 7	33 07	
138	FIX	31 23		194	1	01	
139	FO?	35 71 00	Player SOFT?	195	3	03	} is card 11, 12, or 13? Yes - make it a 10
140	RTN	35 22	No-done	196	X	71	
141	DSP 3	23 03	Yes} set ENG 3 display	197	1	01	
142	ENG	35 23	} for PP, DD .00	198	+	61	} Flash Delay routine
143	RTN	35 22	Done	199	INT	31 83	
144	*LBL 9	31 25 09	Deal to player routine	200	X>Y?	32 81	} Flash routine Format display
145	GSB 7	31 22 07	Deal one card	201	XZY	35 52	
146	1	01	} Increment player card counter	202	RTN	35 22	
147	STO+6	33 61 06		203	*LBL e	32 25 15	} Flash totals
148	XZY	35 52		204	RTN		
149	FO?	35 71 00	is player SOFT?	205	*LBL d	32 25 14	
150	X≠Y?	32 61	No-is card an Ace?	206	GSB 6	31 22 06	
151	GTO 0	22 00	No Ace, or already SOFT	207	PAUSE	35 72	} would a loss cause Bankroll to go negative with this bet?
152	RCL 8	34 08	} is an Ace, was not SOFT, so add 10 and indicate SOFT.	208	GSB e	32 22 15	
153	+	61		209	PAUSE	35 72	
154	CF 0	35 61 00		210	GSB e	32 22 15	} No By 0 if Yes, By 1 if No OK, go on
155	*LBL 0	31 25 00	} Set new player total	211	PAUSE	35 72	
156	STO+2	33 61 00		212	GSB e	32 22 15	
157	FO?	35 71 00		213	PAUSE	35 72	
158	RTN	35 22	SOFT?	214	RTN	35 22	} "Error" - Restart program
159	RCL 0	34 00	No-done	215	*LBL b	32 25 12	
160	RCL 2	34 02	Yes} Player > 21?	216	RCL 4	34 04	
161	X≤Y?	32 71	} remove 10 and clear SOFT indication.	217	CHS	42	} No By 0 if Yes, By 1 if No OK, go on
162	RTN	35 22		218	RCL 5	34 05	
163	RCL 8	34 08		219	+	61	
164	STO-2	33 51 02	} Done	220	0	00	} OK, go on
165	SFO	35 51 00		221	X≤Y?	32 71	
166	RTN	35 22		222	1	01	
167	*LBL 8	31 25 08	Deal to Dealer routine	223	÷	81	
168	GSB 7	31 22 07	Deal one card	224	RTN	35 22	

LABELS

FLAGS

SET STATUS

A ENTER BANKROLL	B HIT	C DOUBLE DOWN	D	E	0 Clear for player "SOFT"	1 Set for Dealer "SOFT"	2	3	ON OFF	TRIG	DISP
a	b CREDIT CHECK	c TIE	d FLASH	e FLASH DELAY					0 ☒ ☐	DEG ☒	FIX ☒
0 used 5 times	1 Display Halt	2 Lose	3 Display Pause	4 Win					1 ☐ ☒	GRAD ☐	SCI ☐
5 Next Dealer Card	6 Format Display	7 Deal one Card	8 Deal to Dealer	9 Deal to Player					2 ☐ ☐	RAD ☐	ENG ☐
									3 ☐ ☐		n <u>0</u>