

UNIVERSITY OF ILLINOIS
DIGITAL COMPUTER LABORATORY
STATISTICAL LIBRARY

REVISED KSL 4.00 - 247

TITLE: Frequency Distributions (SADOI Only)

TYPE: Entire Program

DESCRIPTION: The routine will read a set of n signed integers. These integers will be grouped in ranked categories where the lower boundary of a category is $B + k I$. B and I are parameters; k takes on values from 0 through 99. When the terminating symbol, N , at the end of the data tape is read, the routine will print a frequency chart with a bar graph alongside. The width of the bar graph is automatically adjusted so as to not exceed the width of the teletype paper.

CAPACITY: Maximum number of categories is 100. No other restrictions.

DURATION: $(4d + 40)n + 650C$ milliseconds
 d : digits per integer
 n : number of integers
 C : number of categories
Add 30 seconds for input of master and parameter tapes.

METHOD OF USE:

	Stops
1. Master tape	30617
2. Parameters	2411N
3. Data tape	2411N

A. Additional data tapes using the same parameters may be read by raising the black switch.

B. If a number of distributions are to be constructed, run on stop disable and terminate data tape with a J . Routine will end on OF . To continue with new parameters, raise white switch.

C. To change parameters either at a J stop or an N stop, raise the white switch.

PARAMETER TAPE: The parameter tape consists of two signed integers terminated by an N . The first parameter, B , is the lower boundary of the lowest category. The second parameter, I , is the increment between boundaries.

DATA TAPE: The data tape consists of signed integers terminated by an N . If several distributions using the same parameters are to be constructed, a J after the final N will enable the operator to run on stop disable.

SUM CHECK: The program tape is sum-checked during input. A failure to input the program correctly will result in an FF stop from location 143_{16} .

Frequency Distributions

EXAMPLE:

A. Parameter tape -30+10N
 B. Data tape +30+3-10-20+3+0-8+3+10-7-6+25+1+2+15+20N
 C. Results

DISTRIBUTIONS			
RANGE: -30 TO +970			
NO.	LOWER LIMIT	FREQUENCY	BAR GRAPH
1	-20	1	=
2	-10	4	====
3	+0	6	=====
4	+10	2	==
5	+20	2	==
6	+30	1	=
TOTAL:		16	= EQUALS 1

NOTES:

1. If any number in the set are outside the bounds of B, the lower limit, and B + 99I, the upper limit, these numbers will be printed out as errors.
2. If the parameters, B and I, are terminated by a J instead of an N, the width of the bar graph will no longer be automatically adjusted. Digits following the J will be read in until the first fifth-hole character appears. These digits will form an integer which is equal to one unit of the bar graph.

RT: 2/3/60

DATE	December 4, 1958
SUBMITTED BY	<i>Ken W. Dickman</i>
APPROVED BY	<i>J. Snyder</i>

LOCATION			ORDER	NOTES	PAGE 1	KSL 4.00
Abs.	Rel.	Sym.				
			003K			
3		(B)	00F 00F	} by (1)	(B) Lower boundary	
4		(I)	00F 00F		(I) Increment between boundaries	
5		(=)	00F 00F		(=) Adjustment on bar graph	
6		(F)	00400F 00400F		(F) Address of frequency chart	
7		(S)	00F 00505F		(S) Address of set of numbers	
8		(S-S)	00505F 00505F			
9		(T)	401023F L521(NL2)		(T) Test for NL2	
10		(NL)	40F L521(NL2)		(NL) To calculate final address	
11		(N2)	26(N) 00F		(N2) To transfer out of NL2	
12		(N3)	00F 00F		(N3) Temporary storage for NL2	
13		(U)	00F 00F	by (1)	(U) Upper limit	
14		(E)	00F 00F		(E) Upper address of numbers	
15		(E1)	00F 001023F			
16		(UA)	00F 00F		(UA) Upper address of frequency chart	
17		(LA)	00F 00F		(LA) Lower address of frequency chart	
18		(L)	00F 00F		(L) Total Frequency	
19		(X)	00F 00F		(X) $B + kI$	
20		(Y)	00F 00F		(Y) $F + k(1-1)$	
21		(M)	00F 00F			
22		(J)	00F 00F		(J) Adjustment on bar graph if not automatic	
23		(-)	00F 0010F		(-) 10×2^{-39}	
24		(10)	00F 00F		(10) Category number	
25		(11)	00F 00F		(11) Largest f	
26		(12)	00F 00F		(12) Temporary storage	
27		(100)	00F 00100F			
28		(1-1)	001F 001F			
29		(55)	00F 0052F		(55) Number spaces per line of teletype for bar graph	
30		(P16)	00K			
86		(NL2)	00K			
			00K			
125	0	(N)	L4(NL2) 4621(NL2) from 22(NL2)		(N) Appendage for NL2	

LOCATION			ORDER	NOTES	PAGE 2
Abs.	Rel.	Sym.			
	1		L1(T) L421(N12)		
	2		363L 2623(N12)		
	3		L5F 40(10)	Memory is filled; transfer to (Z1) to assign numbers to categories.	
	4		L51F 40(11)		
	5		L52F 40(12)		
	6		50F 506L		
	7		26(Z1) L5(S)		
	8		0020F 4621(N12)		
	9		L5(10) 40F		
	10		L5(11) 401F		
	11		L5(12) 402F		
	12		264(N12) 00F		transfer back to (N12)
			00K		To clear former frequency
138	0	(CL)	K5F 424L from (2)		
	1		L55L 422L		
	2		41F 41F		
	3		F52L 422L		
	4		L06L 32F		
	5		222L 00400F	Initial clear	
	6		41F 41501F	Final clear	
			00K	To tally frequencies	
145	0	(Z1)	K5F 4218L from 7(N),4(Z)		
	1		L5(S) 425L		
	2		2613(3) 4219L		
	3		L5(B) 40(X)		
	4		L5(F) L0(1-1)		
	5		40(Y) L5F		
	6		40(M) L0(U)		
	7		369L L4(U)		
	8		L0(X) 3620L		
	9		92131F 92259F	Error: # U	
	10		92194F 92262F	or # B	
	11		92578F 92258F		

LOCATION			ORDER	NOTES
Abs.	Rel.	Sym.		
	12		92707F 92835F	
	13		92961F L5(M)	
	14		525F 5014L	
	15		26(P16) 92131F	Print errors
	16		92515F F55L	
	17		425L L019L	
	18		363L 22F	
	19		NO(Y) L5F	
	20		L5(M) L0(X)	Assign frequency
	21		3224L L5(Y)	
	22		4623L 4223L	
	23		F5F 40F	
	24		2216L L5(X)	
	25		L4(I) 40(X)	
	26		L5(Y) L4(1-1)	
	27		40(Y) 2620L	
			00K	To print frequency chart
173	0	(Z)	K5F 4265L from 10(3)	and bar graph
	1		41(L) L5(S)	
	2		FO(L) 424L	
	3		41(10) 503L	
	4		26(Z1) L3F	Determine lower and
	5		366L 269L	upper addresses of
	6		L54L FO(L)	frequency chart
	7		424L 224L	
	8		N1(11) L5F	
	9		L5(F) 4212L	
	10		L5(B) 40(X)	
	11		F54L 42(UA)	
	12		428L L3F	
	13		3614L 2617L	
	14		L5(X) L4(I)	

LOCATION			ORDER	NOTES
Abs.	Rel.	Sym.		PAGE 4
	15		40(X) F512L	
	16		4212L 2212L	
	17		L512L 42(LA)	
	18		4236L 2666L	
	19		41(11) L5F by 24L	
193	20		40(12)L4(L)	Sum f at (L)
	21		40(L) L5(11)	
	22		L0(12) 3624L	Largest f at (11)
	23		L5(12) 40(11)	
	24		F519L 4219L	
	25		L08L 3219L	
	26		L3(J) 3228L	Test: automatic?
	27		L5(/) 40(=)	
	28		2631L F5(10)	
	29		40(=) 2669L	
	30	(/)	00F 00F by (1)	
	31		F5(10) 42(10)	
	32		J22F 5032L	
	33		26(P16) 92961F	Print category number
	34		001F L5(X)	
	35		525F 5035L	
	36		26(P16) L5F	Print lower boundary
	37		40(12) 50F	
	38		J25F 5038L	
	39		26(P16) 92969F	Print frequency
213	40		L1(12) 3243L	
	41		92579F L5(12)	Print: bar graph
	42		L0(=) 40(12)	
	43		3640L 92131F	
	44		92519F F536L	
	45		4236L L5(X)	
	46		L4(I) 40(X)	
	47		F5(LA) 42(LA)	
	48		L0(UA) 3249L	

LOCATION			ORDER	NOTES	PAGE 5
Abs.	Rel.	Sym.			
	49		2631L 92131F		
	50		92259F 92965F		
	51		92322F 92578F		
	52		92322F 92387F		
	53		92962F 92707F		
	54		92835F L5(L)		
	55		527F 5055L		
	56		26(P16) 92969F	Print: total frequency	
	57		92579F 92965F		
	58		92259F 92194F		
	59		9266F 92450F		
233	60		92387F 92962F		
	61		92706F 92707F		
	62		92961F L5(=)		
	63		J22F 5063L		
	64		26(P16) 92135F	Print: adjustment	
	65		92519F 22F		
	66		4219L 42F from 18L		
	67		L5F L0(S)		
	68		3256L 2619L		
	69		L5(55) L0(11) from 29L	Form adjustment	
	70		3631L L5(11)		
	71		L0(55) 40(11)		
	72		F5(=) 42(=)		
	73		2669L 00F		
			00K		
247	0	(1)	52(B) 50L		
	1		26(N12) 40(J)	Input parameters at (B) and (I)	
	2		L3(J) 3610L		
	3		411F 914F		
	4		326L 223L		
	5		914F 326L		
	6		269L 501F		
	7		74(-) S5F		
	8		401F 265L		

LOCATION			ORDER	NOTES	PAGE 6
Abs.	Rel.	Sym.			
	9		L51F 40(/)		
	10		L522(N12) 40(N3)	Change (N12) to transfer to (N)	
	11		L5(N2) 4022(N12)		
			00K	Print: Distributions	
259	0		9259F 9259F	and range	
	1		92135F 92259F		
	2		92997F 9267F		
	3		92514F 92706F		
	4		92322F 92258F		
	5		92514F 92195F		
	6		92450F 92322F		
	7		92514F 92578F		
	8		92770F 92706F		
	9		92131F 92519F		
	10		92981F 92258F		
	11		92387F 92770F		
	12		92579F 92194F		
	13		92707F 92835F		
	14		92965F L5(B)	Print lower boundary, (B)	
	15		524F 5015L		
	16		26(P16) 92965F		
	17		92259F 92322F		
	18		92578F 92707F		
	19		92965F 50(I)	Calculate upper limit, (U)	
	20		75(100) L5(B)		
	21		S4F 40(U)	Print upper boundary,	
	22		524F 5022L	(B + 99I)	
	23		26(P16) 92139F		
	24		92515F 24(2)	Stop for data tape	
			00K	Print captions	
284	0	(2)	92259F 92770F		
	1		92578F 92707F		
	2		92643F 92259F		

LOCATION			ORDER	NOTES	PAGE 7
Abs.	Rel.	Sym.			
	3		92965F 92962F		
	4		92578F 92130F		
	5		92194F 92258F		
	6		92965F 92898F		
	7		92258F 92194F		
	8		9266F 92450F		
	9		92194F 92770F		
	10		92835F 92386F		
	11		92969F 92195F		
	12		92387F 92258F		
	13		92961F 92579F		
	14		92258F 92387F		
	15		922F 92771F		
	16		92131F 92519F		
	17		92977F 92962F		
	18		92514F 92643F		
	19		92514F 92322F		
	20		92707F 92135F		
	21		92519F 5021L	Clear former	
	22		26(CL) 26(3)	frequencies	
			00K	Main routine	
307	0	(3)	L5 (S-S) 462L		
	1		L5(E1) 40(E)		
	2		52F 502L		
	3		26(N12) 40F	Read numbers	
	4		L3F 325L	tests: J or N	
	5		2612L L521(N12)		
	6		L0(N1) 1020F		
	7		40(E) 507L		
	8		26(Z) 92139F		
	9		24(2) 92139F	Stop: end of distribution	
	10		921001F L5(N3)		

LOCATION			ORDER	NOTES	PAGE 8
Abs.	Rel.	Sym.			
	11		4022(N12) 26(1)		
	12		OFF 2610L from 5L	Stop: end of set	
	13		L0(E) 3218(Z1)		
	14		L5(E) 222(Z1)		
			OOK		
322	0		L3F 34(1)	Stop reading master; start at (1)	
	1		FFF 26(1)		
	2		F20996F 7F1469F	Sum check	
			26L 261N		

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