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**MICROCOMPUTER PROGRAMS
FOR
RESEARCH AND BUSINESS**

Shigeaki Shindo

Training Department
Southeast Asian Fisheries Development Center

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INTRODUCTION

This volume contains some microcomputer program lists and examples of output including diagrams, applicable mainly to fishery research. The programs were arranged for a SHARP PC-1500 (CPU) with an additional 8K bytes module and a cassette-recorder interface which has a mini X-Y plotter. The language used here is expanded BASIC.

The user of the programs given here should have some knowledge of mathematics and mathematical statistics, such as null hypotheses, theories of statistical tests, F-table, t-table, table of χ^2 , etc. Indispensable remarks are included in the programs by means of a display on screen or as a printout.

With minor changes in the BASIC language of the statement in program lists described here, programs can be applied to any model of microcomputer which has an X-Y plotter.

S. Shindo

1. Exponential regression and plotting - PROG.-S01

```

5:REM PROG.-S01
6:REM DEF -S-
7:REM *****
  *EXPONENTIAL *
  * REGRESSION *
  * & PROTING *
  *****
8:"S":CLEAR :
  LPRINT "
  y=a.b^x":LF 1
9:LPRINT "(1) DE
  F -M-":LPRINT
  "DATA INPUT, C
  ALCULATION OF
  a AND b,"
10:LPRINT "CALCUL
  ATION OF r (r
  =CORRALATION C
  OEFFICIENT)":
  LF 1
11:LPRINT "(2) DE
  F -N-":LPRINT
  "PRINT DIAGRAM
  ":LPRINT "INPU
  T DATA = SMALL
  BOX"
12:LPRINT "ESTIMA
  TED DATA = *":
  LF 3
15:END
20:"M":CLEAR :
  WAIT 0:CLS
30:INPUT "No. of D
  ATA=?":N
40:DIM X(N-1), Y(N
  -1):E=10^8:G=E
  :D=-E:F=D
45:FOR I=0TO N-1
50:CLS :A$="X(" +
  STR$ (I+1)+")=
  "
60:PRINT A$:
70:INPUT X(1):
  GOTO 90
80:N=I:GOTO 150
90:CLS :A$="Y(" +
  STR$ (I+1)+")=
  "
100:PRINT A$:
110:INPUT Y(1):Y=
  LN Y(1)
112:IF D<X(1)LET D
  =X(1)
114:IF E>X(1)LET E
  =X(1)
116:IF F<Y(1)LET F
  =Y(1)
118:IF G<Y(1)LET G
  =Y(1)
120:Q=Q+X(1):P=P+Y
  130:Q=Q+X(1)*X(1):
  R=R+Y*Y:S=S+X(
  1)*Y
140:NEXT I
150:X=Q/N:Y=P/N
160:T=Q-N*X*X
170:U=S-N*X*Y
180:V=R-N*Y*Y
190:C=U/J(T*U)
200:B=U/T
210:A=EXP (Y-B*X)
220:B=EXP B
230:LPRINT "r=";C
240:LPRINT "a=";A
250:LPRINT "b=";B
255:LF 1:END
260:"N":M=F/300
270:IF E>0LET Z=2
  5:L=0/175:GOTO
  290
280:L=(D+ABS E)/20
  0:Z=ABS E/L+5
290:GRAPH :
  GLCURSOR (Z, -3
  50):SORGN
300:LINE (-Z, 0)-(-2
  10-Z, 0):
  GLCURSOR (175,
  -15):LPRINT "X
  "
310:LINE (0, -50)-(-
  0, 350):
  GLCURSOR (-15,
  340):LPRINT "Y
  "
320:GLCURSOR (-15,
  -15):LPRINT "O
  "
330:FOR I=0TO N-1
340:J=X(1)/L:K=Y(I
  )/M
350:LINE (J-4, K-4)
  -(J+4, K+4),, B
360:NEXT I
370:J=-Z:K=A*B^(J*
  L)/M
380:J1=J+2:IF J>20
  0-ZGOTO 400
390:K1=A*B^(J1*L)/
  M:IF K1>350
  GOTO 400
395:LINE (J, K)-(-J1
  , K1):J=J1:K=K1
  :GOTO 380
400:I=0
410:IF I>NTHEN 47
  0
420:CLS :INPUT "ES
  TIMATION X=";X
  (1):GOTO 440
430:N=I:GOTO 470
440:J=X(1)/L:Y(I)=
  A*B^X(1):K=Y(I
  )/M
445:IF K>350GOTO 4
  60
450:GLCURSOR (J-4,
  K-5):LPRINT "*"
  "
460:I=I+1:GOTO 410
470:GLCURSOR (0, -1
  00):TEXT
  500:LPRINT " **ES
  TIMATION**":LF
  1
510:FOR I=0TO N-1
520:LPRINT "X=";X(
  I)
530:LPRINT "Y=";Y(
  I)
540:NEXT I
550:LF 4:END

STATUS (1)
1489

*****
REARRANGED
By S. SHINDO
APR. 1984 SEAFDEC
*****

```

```

*****
      PROG.-S01
RESULT OF PRINTOUT
*****

```

$$y=a.b^x$$

(1) DEF -M-
DATA INPUT, CALCULATION OF a AND b,
CALCULATION OF r
(r=CORRELATION COEFFICIENT)

(2) DEF -N-
PRINT DIAGRAM
INPUT DATA = SMALL
BOX
ESTIMATED DATA = *

-----DEF M-----

r= 9.968992291E-01
a= 2.065098506
b= 1.196590752

-----DEF N-----



ESTIMATION

X= 27
Y= 262.7078844
X= 28
Y= 314.3538249
X= 23
Y= 128.141717
X= 17
Y= 43.65326047
X= 22
Y= 107.0890083
X= 28
Y= 314.3538249
X= 29
Y= 376.1528798

2. Exponential curve and estimation - PROG.-S02

```

5:REM PROG.-S02
6:REM DEF -A-
7:REM *****
  *EXPONENTIAL *
  * CURVE and *
  * ESTIMATION *
  *****
8:"A":CLEAR :
  LPRINT "      y
=k-ab^x":LF 1:
  LPRINT "(1)If
k is known,
  press DEF -B-
"
9:LPRINT "(2)If
k is unknown
  press DEF -C-
":LPRINT "When
  key-in is fin
  ished, press E
  NTER
10:LF 3:END
20:"B":CLEAR :
  WAIT 0
30:INPUT "No.of D
  ATA=?";D,"k=?"
  :C
35:DIM X(D-1),Y(D
  -1)
40:FOR I=0TO D-1
50:CLS :A$="X(" +
  STR$ (I+1)+")="
  "
55:PRINT A$;
60:INPUT X(I):
  GOTO 80
70:CLS :D=I-1:
  GOTO 120
80:CLS :A$="Y(" +
  STR$ (I+1)+")="
  "
90:PRINT A$;
100:INPUT Y(I)
110:NEXT I
120:CLS :FOR I=0TO
  D-1
125:Y=LN (C-Y(I))
130:E=E+X(I):F=F+X
  (I)*X(I)
140:G=G+Y:H=H+X(I)
  *Y
150:NEXT I
160:B=D*F-E*E
170:A=(F*G-E*H)/B
175:B=(D*H-E*G)/B
180:A=EXP A:B=EXP
  B
190:BEEP 5:LPRINT
  "a=";A:LPRINT
  "b=";B:GOTO 40
  0
200:"C":CLEAR :
  WAIT 0:CLS :
  DIM Y(2):BEEP
  5
205:WAIT 150:PRINT
  "  **Key-in Y(
  1) only**":
  WAIT :BEEP 5:
  WAIT 0
210:INPUT "No.of D
  ATA=?";N
220:N=INT (N/3)
230:FOR C=1TO 3
240:FOR X=N*(C-1)
  TO N*C-1
250:CLS :A$="Y(" +
  STR$ (X+1)+")="
  "
260:PRINT A$;
270:INPUT L
280:Y(C-1)=Y(C-1)+
  L
290:NEXT X:NEXT C
300:CLS :C=N:B=((Y
  (2)-Y(1))/(Y(1)
  )-Y(0))^(1/C)
310:D=B^C-1:A=(Y(0)
  )-Y(1))*(B-1)/
  (D*D)
320:C=(Y(0)+D*A/(B
  -1))/C
330:BEEP 5:LPRINT
  "a=";A:LPRINT
  "b=";B:LPRINT
  "k=";C
400:LF 1:LPRINT "
  **ESTIMATION
  **":CLS :LF 1
410:BEEP 2:INPUT "
  X=";X:GOTO 430
420:END
430:LPRINT "X=";X:
  LPRINT "Y=";C-
  A*B^X
440:GOTO 410
500:END

```

STATUS (1)

1104

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RESULT OF PRINTOUT

---DEF B---

a= 9.221620469

b= 9.850826026E-01

ESTIMATION

X= 6

Y= 541.5735793

X= 14

Y= 542.5282156

X= 20

Y= 543.1725233

X= 25

Y= 543.6667961

---DEF C---

a=-14.98573397

b= 1.087380373

k= 41.33333333

ESTIMATION

X= 14

Y= 89.75267451

X= 16

Y= 98.58417233

X= 21

Y= 128.3674056

X= 26

Y= 173.6445776

3. Geometric and harmonic average - PROG.-S08

```

5:REM PROG.-S08
6:REM DEF -A-
7:REM *****
  * GEOMETRIC *
  * AVERAGE *
8:REM ---AND---
  * HARMONIC *
  * AVERAGE *
  *****
10:"A":CLEAR :
  CSIZE 2:WAIT 0
15:BEEP 3:INPUT "
  No.of DATA=?";
  N
20:BEEP 5:PAUSE "
  *** DATA I
  NPUT ***"
22:DIM X(N-1)
25:FOR I=0TO N-1
30:CLS :A$="DATA(
  "+STR$(I+1)+
  )"=
45:PRINT A$;
50:BEEP 2:INPUT X
  (I)
55:NEXT I
59:REM *****
60:G=1:FOR I=0TO
  N-1
70:G=G*X(I)
75:H=H+1/X(I)
80:NEXT I
90:LPRINT "GEOMET
  .AVERAGE=",G^(
  1/N)
100:LPRINT "HARMON
  .AVERAGE=",N/H
  :LF 1
105:CSIZE 1
110:LPRINT "
  RECORD OF IN
  PUT DATA":LF 1
120:FOR I=0TO N-1
130:LPRINT TAB 12;
  X(I)
132:IF I=4LF 1
134:IF I=9LF 1
136:IF I=14LF 1
138:IF I=19LF 1

```

```

140:IF I=24LF 1
142:IF I=29LF 1
144:IF I=34LF 1
146:IF I=39LF 1
148:IF I=44LF 1
150:NEXT I
160:CSIZE 2:LF 1
165:LPRINT "
  -END---"
170:G=0:H=0:LF 4
180:END

```

STATUS (1)

675

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RESULT OF PRINTOUT

GEOMET.AVERAGE=
31.87046216
HARMON.AVERAGE=
27.74096373

RECORD OF INPUT DATA

12.5
14
25
16.2
25.8
42.1
18.5
43
28.6
42.1
41.1
17.2
18.5
23.3
14.2
53.1
74
52.1

---END---

GEOMET.AVERAGE=
35638.41222
HARMON.AVERAGE=
29305.33431

RECORD OF INPUT DATA

17345
23456
14567
45678
16789
78910

---END---

4. Quadratic equation - PROG.-S10

```

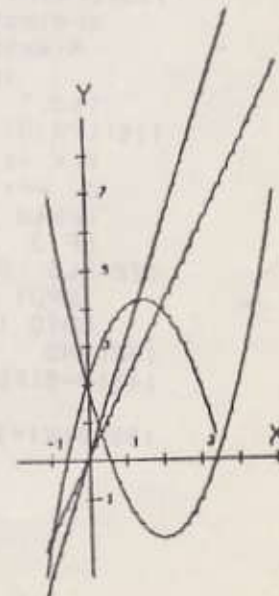
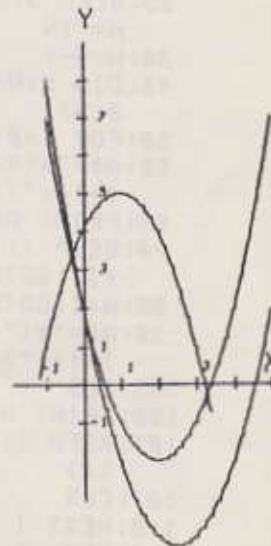
5:REM PROG.-S10
6:REM -RUN-
7:REM *****
  * QUADRATIC *
  * EQUATION *
  * *****
8: CLEAR :TEXT :
  CSIZE 2
9: LPRINT " ax^
  2+bx^1+c^0":LF
10: LPRINT "Input
  a, b & c, then
  computer gener
  ates graph.":LF
11: Y=0: D=-1: E=3
12: K=0: U=0
13: BEEP 3: INPUT "
  a=";A, "b=";B, "
  c=";C
14: IF Y<>0 GOTO 30
15: TEXT :LF 15:
  GRAPH :CSIZE 1
16: GLCURSOR (00,0
  ):SORGN
17: LINE (-50,0)-(-
  125,0):LINE (0
  ,-75)-(0,225)
18: GLCURSOR (-2,2
  35):CSIZE 2:
  LPRINT "Y":
  CSIZE 1
19: FOR J=200 TO -2
  5 STEP -25
20: LINE (-4,1)-(-4
  ,1)
21: NEXT J
22: FOR J=-27 TO 17
  3 STEP 50
23: GLCURSOR (5,1)
  :LPRINT D:D=D+
  2
24: NEXT J
25: FOR J=-25 TO 12
  5 STEP 25
26: LINE (1,4)-(1,
  -4)
27: NEXT J
28: GLCURSOR (120,
  9):CSIZE 2:
  LPRINT "X":
  CSIZE 1
29: FOR J=23 TO -27
  STEP -50
30: GLCURSOR (J,9)
  :LPRINT E:E=E-
  2
31: NEXT J
32: Y=1
33: IF A=0 GOTO 400
34: IF A>0 LET G=-2
  5:F=120:GOTO 3
  50
35: IF A<0 LET G=-3
  0:F=80:GOTO 35
  0
36: FOR J=6 TO F
  STEP 5
37: IF K>350 GOTO 5
  00
38: IF K<-200 GOTO
  500
39: J=INT (0.04*A*
  1*J+0*J+25*C)
40: K=INT (0.04*A*
  (1+5)*(1+5)+0*
  (1+5)+25*C)
41: LINE (J,J)-(J+
  5,K)
42: NEXT J
43: GOTO 500
44: FOR S=-30 TO 12
  5 STEP 5
45: T=B*S+25*C:U=B
  *S+5)+25*C
46: LINE (S,T)-(S+
  5,U)
47: NEXT S
48: BEEP 3: INPUT "
  END=0, AGAIN=1
  ?";P
49: IF P=1 GOTO 15
50: TEXT :LF 20
51: CSIZE 2:END
  STATUS (1)

```

 PROG.-S10
 RESULT OF PRINTOUT

$$ax^2+bx^1+c^0$$

Input a, b & c, then
 computer generates
 graph.



933

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5. Lagrange's interpolation - PROG.-S50

```

5:REM PROG.-S50
6:REM DEF -A-
7:REM *****
  * LAGRANGE'S *
  * INTERPOLATION *
  *****
10:"A":CLEAR:
  WAIT 8
20:BEEP 3:LPRINT
  "N = No. of kno
  wn CO -ORDI
  NATES.":LF 3
25:BEEP 3:INPUT "
  N=":N
30:N=N-1
40:DIM X(N),Y(N),
  B(N)
50:FOR J=0TO N
60:A$="X("+STR$ (
  J+1)+")="
65:PRINT A$;
70:BEEP 1:INPUT X
  (J):GOTO 90
80:N=1:GOTO 120
90:A$="Y("+STR$ (
  J+1)+")="
95:CLS
100:PRINT A$;
105:BEEP 1:INPUT Y
  (J)
107:CLS
110:NEXT J
115:LPRINT "Z= Co-
  ordinates on
  X-axis to be
  interpola
  ted."
116:LPRINT "When w
  ork is finishe
  d, press key m
  arked ENTER.":
  LF 3
120:CLS:BEEP 3:
  INPUT "Z=":Z:
  GOTO 140
130:END
140:P=0:FOR K=0TO
  N
150:B(K)=1

```

```

160:FOR J=0TO N
170:IF J=KTHEN 190
180:B(K)=B(K)*(Z-X
  (J))/(X(K)-X(J)
  )
190:NEXT J
200:P=P+B(K)*Y(K)
210:NEXT K
220:LPRINT "INT.PO
  LAT. X=":Z
230:LPRINT "INT.PO
  LAT. Y=":P:LF
  1
240:GOTO 120
250:END

```

STATUS (1)

670

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RESULT OF PRINTOUT

N = No. of known CO
-ORDINATES.

Z= Co-ordinates on
X-axis to be
interpolated.
When work is finis
hed, press key mar
ked ENTER.

INT.POLAT. X= 10.5
INT.POLAT. Y= 9.50
555231

INT.POLAT. X= 22
INT.POLAT. Y= 56.1
021123

INT.POLAT. X= 40.6
INT.POLAT. Y= 544.
8386725

6. Sperman's rank correlation (ρ) - PROG.-S32

```

5:REM PROG.-S32
6:REM DEF -X-
7:REM *****
  * SPERMAN'S *
  RANK CORR. COEF
  *****
10:"X":CLEAR:
  CSIZE 2
12:LPRINT "Rho=1-
  ((6*SIGMA(Xi
  -Yi)^2)/(n^3-n
  ))":LF 1
14:LPRINT "Xi=RAN
  K of ITEM i
  in GROUP A"
16:LPRINT "Yi=RAN
  K of ITEM i
  in GROUP B":
  LF 3
20:BEEP 3:INPUT "
  No. of ITEMS=?
  ":N
30:BEEP 3:PAUSE "
  ** DATA 1
  NPUT **"
40:DIM X(N-1),Y(N
  -1)
45:WAIT 0
50:FOR J=0TO N-1
60:CLS:A$="Gr. A/
  ITEM("+STR$(J
  +1)+")="
70:BEEP 1:PRINT A
  $;
80:INPUT X(J)
90:CLS:A$="Gr. B/
  ITEM("+STR$(J
  +1)+")="
100:BEEP 1:PRINT A
  $;
110:INPUT Y(J)
120:NEXT J:CLS
125:REM *****
130:LF -2:CSIZE 1
140:LPRINT "
  RECORD OF 1
  NPUT DATA":LF
  1
145:LPRINT "

```

```

      GROUP A
      GROUP B":LF
      1
150:FOR J=0TO N-1
160:LPRINT TAB 12;
  X(J):LF -1:
  LPRINT TAB 22;
  Y(J)
170:NEXT J
180:CSIZE 2:LF 1:R
  =0
190:LPRINT "N=";N
200:A=6/(N^3-N)
210:FOR J=0TO N-1
220:S=S+((X(J)-Y(J
  ))^2)
230:NEXT J
240:R=1-A*S
250:USING "##.####
  ##"
260:LPRINT "Rho=";
  R:LF 4:USING
  270:END

```

STATUS (1) 762

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RESULT OF PRINTOUT

$$\rho = 1 - ((6 \sum (X_i - Y_i)^2) / (n^3 - n))$$

X_i = RANK of ITEM i
in GROUP A
 Y_i = RANK of ITEM i
in GROUP B

RECORD OF INPUT DATA

GROUP A	GROUP B
1	1
2	2
3	3
4	4
5	5

N= 5
Rho= 1.000000

RECORD OF INPUT DATA

GROUP A	GROUP B
1	5
2	4
3	3
4	2
5	1

N= 5
Rho= -1.000000

RECORD OF INPUT DATA

GROUP A	GROUP B
3	6
4	7
1	3
7	5
2	1
1	2
6	4

N= 7
Rho= 0.642857

7. Logistic curve and estimation - PROG.-S40

```

5:REM PROG.-S40
6:REM DEF -A-
7:REM *****
  * LOGISTIC *
  * CURVE *
8:REM -----*
  * ESTIATION Y *
  * *****
10:"A":CLEAR:
  TEXT:WAIT 0
15:LPRINT "y=k/(1
  +me EXP-ax)":
  LF 3
20:BEEP 3:INPUT "
  k is known=1,un
  known=2 ?":X:
  IF X>=3GOTO 30
25:IF X=2GOTO 260
30:BEEP 3:INPUT "
  k=?":C
50:BEEP 3:INPUT "
  No. of DATA=?"
  :D
60:DIM X(D-1),Y(D
  -1)
70:FOR J=0TO D-1:
  BEEP 1
80:A$="X("+STR$ (
  J+1)+")=":BEEP
  1
90:PRINT A$:
95:INPUT X(J):
  BEEP 1
100:CLS:A$="Y("+
  STR$ (J+1)+")="
  ":BEEP 1
105:PRINT A$:
110:INPUT Y(J)
120:CLS:NEXT J
130:PRINT " **
  COMPUTATION **
  "
150:X1=10^8:X2=-X1
160:FOR J=0TO D-1
170:IF X(J)<X1LET
  X1=X(J)
180:IF X(J)>X2LET
  X2=X(J)
210:Y=LN (C/Y(J))-1
  ):E=E+X(J):F=F
  +X(J)*X(J)
220:G=G+Y:H=H+X(J)
  *Y:NEXT J
230:B=D*F-E*E:A=(F
  *G-E*H)/B:B=(D
  *H-E*G)/B
240:A=EXP A:B=-B:
  LPRINT "a=";B:
  LPRINT "m=";A:
  GOTO 500
250:REM *****
260:CLEAR:WAIT 0:
  USING
270:PRINT " *
  * COMPUTATION
  *"
300:BEEP 3:INPUT "
  No. of DATA=?":
  D:A=INT (D/3)
310:DIM X(A*3-1),Y
  (A*3-1),B(2)
320:FOR C=1TO 3
330:FOR J=(C-1)*A
  TO C*A-1
340:BEEP 1:A$="Y("
  +STR$ (J+1)+")"
  =" :PRJNT A$:
350:INPUT Y(J):X(J
  )=J:CLS
360:B(C-1)=B(C-1)+
  1/Y(J)
370:NEXT J:NEXT C
380:Z=1:D=3*A
385:Y1=Y(0):Y2=Y(0
  )
390:FOR J=0TO D-1
395:IF Y(J)<Y1LET
  Y1=Y(J)
400:IF Y(J)>Y2LET
  Y2=Y(J)
410:NEXT J
420:X1=0:X2=1*3*A-
  1
430:C=A:B=((B(2)-B
  (1))/(B(1)-B(0
  )))^(1/C)
440:D1=B/C-1:A=(B(
  0)-B(1))*B(B-1)
  /(D1*D1)
450:C=(B(0)+D1*A/(
  B-1))/C
460:C=1/C:A=-A*C:B
  =-LN B
462:X1=-1/B*LN ((C
  /Y1-1)/A)
464:X2=-1/B*LN ((C
  /Y2-1)/A)
470:LPRINT "a=";B
480:LPRINT "m=";A
490:LPRINT "k=";C
499:REM *****
500:BEEP 3:INPUT "
  Graph, Estm.:Ye
  s=1, No=2 ?":Q0
  :IF Q0>=3GOTO
  500
502:IF Q0=2GOTO 06
  0
503:PAUSE "
  ** GRAPH **":
  GRAPH
504:U=10:W=-250:IF
  C<0LET U=-20:W
  =-50
505:IF X1>0LET X1=
  0
510:X3=X1:M=X2-X3
520:N=M/100:L=C/17
  5
530:GLCURSOR (25,W
  ):SORGN
540:GLCURSOR (-12,
  U-30):LPRINT "
  Q"
550:LINE (-20,0)-(-
  175,0):LINE (1
  65,5)-(175,0)-
  (165,-5)
560:GLCURSOR (177,
  U-16):LPRINT "
  X"
570:IF C>=0LINE (0
  ,-25)-(-20,225):
  LINE (-5,215)-
  (0,225)-(5,215
  ):GOTO 590
580:LINE (0,25)-(0

```

```

      , -225): LINE(-5
      , -215)-(5, -215
      )
590: GLCURSOR (-3, 2
      32): LPRINT "Y"
      : T=C/L
600: LINE (175, T)-(-
      -20, T):
      GLCURSOR (-15,
      T+5): LPRINT "k
      "
610: Q=-15: S=Q*N: P=
      (C/(1+A*EXP (-
      B*S)))/L
620: IF Q=17560 TO
      650
630: S=(Q+5)*N: Q=(C
      /(1+A*EXP (-B*
      S)))/L
640: LINE (Q, P)-(Q+
      5, Q): Q=Q+5: P=Q
      : GOTO 620
650: FOR J=0 TO D-1
660: S=X(J)/N: R=Y(J
      )/L
670: GLCURSOR (S, R-
      5): LPRINT "*"
680: NEXT J
690: I=0
700: IF J<D INPUT "E
      STIMATION X=";
      X(I): GOTO 730
710: GOTO 800
730: Y(I)=C/(1+A*
      EXP (-B*X(I)))
      : S=X(I)/N: R=Y(
      I)/L: I=I+1
740: LINE (S-3, R-3)
      -(S+3, R+3), , B
      : GOTO 700
800: GLCURSOR (0, 0)
      : GLCURSOR (0, -
      (300+W))
810: TEXT : LF 1:
      LPRINT " *E
      STIMATION*": LF
      1
820: FOR J=0 TO I-1
830: LPRINT "X="; X(

```

```

      J)
840: LPRINT "Y="; Y(
      J): LF 1
850: NEXT J
855: LPRINT " ---
      END---": LF 4
860: END
STATUS(1)=2196

```

XXXXXXXXXXXXXXXXXXXXXXXXXXXX

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XXXXXXXXXXXXXXXXXXXXXXXXXXXX



XXXXXXXXXXXXXXXXXXXX

RESULT OF PRINTOUT

PROG.-S40

XXXXXXXXXXXXXXXXXXXX

-- k = known --

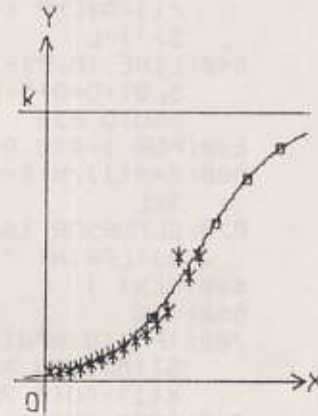
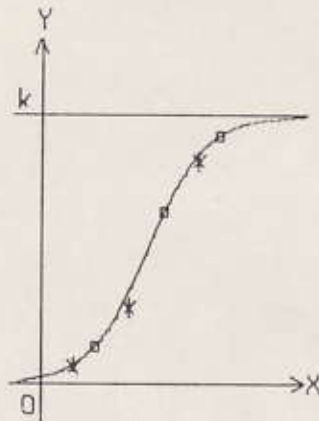
-- k = unknown --

$$y = k / (1 + \exp(-ax))$$

$$y = k / (1 + \exp(-ax))$$

a = 4.789155979E-01
m = 41.69111427

a = 2.586396263E-01
m = 43.12315462
k = 1816.126007



ESTIMATION

ESTIMATION

X = 4
Y = 27.5957611

X = 10
Y = 427.6477449

X = 13
Y = 181.9952636

X = 19
Y = 1379.398318

X = 9
Y = 126.2881196

X = 22
Y = 1585.128068

---END---

X = 16
Y = 1075.995022

---END---

8. Test of mean and variance between two groups of normal distribution - PROG.-S33

```

5:REM PROG.-S33
6:REM DEF -C-
7:REM *****
  * TEST OF *
  * MEAN AND *
  * VARIANCE *
8:REM -----*
  *BETWEEN TWO *
  * GROUPS OF *
  *NORMAL-DISTR*
  *****
10:"C":CLEAR:
  LPRINT "(1) TE
  ST OF MEAN"
12:LPRINT "PREMI
  SE":LPRINT "(a
  )Each group ha
  s NORMAL distr
  bution"
14:LPRINT "(b)Eac
  h group has sa
  me S.D.(of pop
  ulation).":
  LPRINT "T-TABL
  E necessary."
16:LPRINT "(2) TE
  ST OF VARIANCE
  ":LPRINT "F-TA
  BLE necessary.
  ":LF 1
18:LPRINT "-----
  ":
  LF 1:LPRINT "K
  EYSTROKES (STA
  RT)":LF 1
20:LPRINT "(1) TE
  ST OF MEAN":
  LPRINT "If No.
  of DATA, MEAN&
  S.D. of each
  group are kn
  own,"
22:LPRINT "Press
  DEF and A."
24:LPRINT "If unk
  nown,:LPRINT
  "Press DEF and
  B.":LF 1
26:LPRINT "(2) TE
  ST OF VARIANCE
  ":LPRINT "If N
  o. of DATA, S.D.
  are known,"
28:LPRINT "Press
  DEF and X":
  LPRINT "If unk
  nown, press DE
  F and Z":LF 3
29:END
30:"A":CLEAR
40:BEEP 3:INPUT "
  No. of DATA (Gr
  .A)=?";M
45:BEEP 3:INPUT "
  No. of DATA (Gr
  .B)=?";N
50:BEEP 3:INPUT "
  MEAN (Gr.A)=?"
  :Y
55:BEEP 3:INPUT "
  MEAN (Gr.B)=?"
  :X
60:BEEP 3:INPUT "
  S.D. (Gr.A)=?"
  :R
65:BEEP 3:INPUT "
  S.D. (Gr.B)=?"
  :S
70:R=R*(M-1)
80:S=S*(N-1):
  GOTO 110
90:"B":LPRINT "In
  put DATA(X=) o
  f Group A.":
  LPRINT "When f
  inished, pr
  ess key marked
  "
91:LPRINT "ENTER.
  ":LPRINT "Afte
  r T and PHI
  are printed, (
  X=) appears ag
  ain."
92:LPRINT "Input
  DATA of Gr.BWh
  en finished, p
  res ENTER.":
  LF 3
95:GOSUB 900
100:M=N:R=S:Y=X:
  GOSUB 900
110:L=M+N
120:T=(Y-X)*J(M*N*
  (L-2)/(L*(R+S)
  ))
130:LPRINT "T=";T:
  LPRINT "PHI=";
  L-2:LF 1
135:LPRINT "See T-
  TABLE(PHI=NI+N
  2-2) and check
  Tabove.":LF 3
140:END
150:"X"
152:BEEP 3:INPUT "
  No. of DATA(Gro
  up A)=?";M
154:BEEP 3:INPUT "
  No. of DATA(Gro
  up B)=?";N
160:BEEP 3:INPUT "
  S.D. (Group.A)=
  ?";R
165:BEEP 3:INPUT "
  S.D. (Group B)=
  ?";S
170:R=R*R:S=S*S:
  GOTO 210
180:"Z":LPRINT "In
  put DATA(X=) o
  f Group A.":
  LPRINT "When f
  inished, pr
  ess key marked
  "
181:LPRINT "ENTER.
  ":LPRINT "Afte
  r M, S.D., etc.
  are printed, (
  X=) appears ag
  ain."
182:LPRINT "Input
  DATA of Gr.BWh
  en finished, p
  res ENTER.":
  LF 3
185:GOSUB 900
190:M=N:R=S:GOSUB

```

```

900
200:R=R/(M-1):S=S/
(N-1)
210:IF S>RLET Z=M:
M=N:N=Z:Z=S:S=
R:R=Z
220:LPRINT "F=";R/
S
230:LPRINT "PHI A=
";M-1
240:LPRINT "PHI B=
";N-1
242:LF 1:LPRINT "S
ee F-TABLE (F=
U1/U2, U=(S.D.
)^2, PHI A=N1-
1, PHI B=N2-1)
"
243:LPRINT "If U1<
U2, then F=U2/
U1." :LF 4
250:END
899:REM *****
900:N=0:T=0:S=0
910:BEEP 3:INPUT "
X=";X:GOTO 930
920:GOTO 950
930:N=N+1:T=T+X
940:S=S+X*X:GOTO 9
10
950:X=T/N:S=S-N*X*
X
960:CLS :LPRINT "M
EAN=";X
970:LPRINT "STANDA
RD DEV.=";J(S/
(N-1))
980:LF 1:RETURN
990:END

```

STATUS (1)

2072

```

*****
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*****

```

RESULT OF PRINTOUT PROG.-S33

(1) TEST of MEAN
 PREMISE
 (a)Each group has
 NORMAL distribution
 (b)Each group has
 same S.D.(of popul
 ation).
 T-TABLE necessary.
 (2) TEST OF VARIAN
 CE
 F-TABLE necessary.

KEYSTROKES (START)

(1) TEST OF MEAN
 If No.of DATA, MEAN
 & S.D. of each
 group are known,
 Press DEF and A.
 If unknown,
 Press DEF and B.
 (2) TEST OF VARIAN
 CE
 If No.of DATA, S.D.
 are known,
 Press DEF and X
 If unknown, press
 DEF and Z

DEF -A-

T=-1.609164563
 PHI= 12

See T-TABLE(PHI=N1
 +N2-2) and check T
 above.

DEF -B-

Input DATA(X=) of
 Group A.
 When finished,
 press key marked
 ENTER.
 After T and PHI
 are printed, (X=)
 appears again.
 Input DATA of Gr.B
 When finished, pre
 ss ENTER.

MEAN= 2.1125
 STANDARD DEV.=
 2.748376144E-01

MEAN= 2.383333333
 STANDARD DEV.=
 2.857738067E-01

T=-1.79456928
 PHI= 12

See T-TABLE(PHI=N1
 +N2-2) and check T
 above.

DEF -X-

F= 1.753035174
PHI A= 5
PHI B= 4

See F-TABLE (F=U1/
U2, U=(S.D.)², PH
I A=N1-1, PHI B=N2
-1)
If U1<U2, then F=U
2/U1.

DEF -Z-

Input DATA(X=) of
Group A.
When finished,
press key marked
ENTER.
After M, S.D., etc.
are printed, (X=)
appears again.
Input DATA of Gr.B
When finished, pre
ss ENTER.

MEAN= 1.28
STANDARD DEV.=
1.923538406E-01

MEAN= 1.116666667
STANDARD DEV.=
3.920034002E-01

F= 4.15315313
PHI A= 5
PHI B= 4

See F-TABLE (F=U1/
U2, U=(S.D.)², PH
I A=N1-1, PHI B=N2
-1)
If U1<U2, then F=U
2/U1.

9. Test of conformity on frequency distribution, using χ^2 - PROG.-S31

```

5:REM PROG.-S31
6:REM DEF -Z-
7:REM *****
  * TEST OF *
  *CNONFORMITY*
  *ON FREQUENCY*
  *DISTRIBUTION*
8:REM -----*
  * USING *
  * CHI-SQUARE *
  * METHOD *
  *****
10:"Z":CLEAR :
  SIZE 2
15:LPRINT "(Note)
  CHI-SQUARE TA
  BLE (Phi=k-1)
  isnessesary.":
  LF 3
20:BEEP 3:WAIT 10
  0:PRINT "
  ** DATA INPUT
  **":WAIT
30:BEEP 3:INPUT "
  No. of DATA=?":
  Z:WAIT 0
32:DIM N(Z-1),M(Z
  -1)
35:FOR I=0 TO Z-1:
  BEEP 1
40:CLS :A$="ACTUA
  L DATA("+STR$
  (I+1)+")="
50:PRINT A$:
60:INPUT N(I)
70:BEEP 1:CLS :B$
  ="EXPCT. DATA("
  +STR$ (I+1)+")
  ="
80:PRINT B$:
90:INPUT M(I)
100:BEEP 3:NEXT I
110:FOR I=0 TO Z-1
120:X=N(I)-M(I)
130:T=T+X*X/M(I)
135:NEXT I
140:LPRINT "CHI-SQ
  UARE=":T
150:LPRINT "DEG. of
  Feed.=":Z-1:
  LF 1
160:LPRINT "See TA
  BLE of CHI-SQ
  UARE (Phi=k-1)
  and check.":
  LF 4
170:END
STATUS(1)=643
  *****
  By S. SHINDO
  APR. 1984 SEAFDEC
  *****
  *****
  RESULT OF PRINTOUT
  *****
  (Note) CHI-SQUARE
  TABLE (Phi=k-1) is
  nessesary.
  CHI-SQUARE= 7.7337
  66234
  DEG. of Feed.= 11
  See TABLE of CHI-
  SQUARE (Phi=k-1)
  and check.

```

10. Correlation coefficient and plotting - PROG.-S75

```

5:REM PROG.-S75
6:REM DEF -A-
7:REM *****
  * CORRELATION*
  * COEFFICIENT *
  * PLOTTING *
  *****
18:"A":CLEAR:
  WAIT 8
20:BEEP 3:INPUT "
  No. of DATA=?"
  :N
30:DIM X(N),Y(N)
40:FOR J=0TO N-1
50:CLS:A$="DATA
  X("+STR$(J+1)
  +")="
52:PRINT A$;
54:INPUT X(J)
56:CLS:A$="DATA
  Y("+STR$(J+1)
  +")="
60:PRINT A$;
70:INPUT Y(J)
80:NEXT J
90:REM *****
100:FOR J=0TO N-1
110:IF MX<X(J)LET
  MX=X(J)
115:IF MY<Y(J)LET
  MY=Y(J)
120:S1=S1+X(J):S2=
  S2+Y(J)
130:NEXT J
135:TEXT
140:LPRINT "MAX X="
  :MX
145:LPRINT "MAX Y="
  :MY:LF 1
150:LPRINT "MEAN X
  =" :S1/N
155:LPRINT "MEAN Y
  =" :S2/N:LF 2
160:X=200/MX:Y=300
  /MY
170:GRAPH:
  GLCURSOR (0,-3
  00):SORGN
180:LINE (0,300)-(
  0,0)-(214,0)
200:FOR J=0TO N-1
205:FOR J=0TO J
210:LINE (X(J)*X-2
  ,Y(J)*Y-2)-(X(
  J)*X+2,Y(J)*Y+
  2),,,B
220:NEXT J
230:NEXT J:CLS
240:GLCURSOR (0,0)
250:BEEP 3:INPUT "
  INTERVAL,X-aix
  is=?":XX
260:BEEP 3:INPUT "
  INTERVAL,Y-aix
  is=?":YY
265:A=0
270:FOR J=0TO 214
  STEP XX*X
280:LINE (J,0)-(J,
  300),J:
  GLCURSOR (J-11
  ,-15):CSIZE J:
  LPRINT A:A=A+X
  X
290:NEXT J
295:A=0
300:FOR J=0TO 300
  STEP YY*Y
310:LINE (0,J)-(30
  0,J),J:
  GLCURSOR (2,1+
  5):LPRINT A:A=
  A+YY
320:NEXT J:CSIZE 2
330:GLCURSOR (0,0)
340:REM *****
350:XX=0:YY=0:XY=0
360:FOR J=0TO N-1
370:XX=XX+(X(J)-S1
  /N)^2
380:YY=YY+(Y(J)-S2
  /N)^2
390:XY=XY+(X(J)-S1
  /N)*(Y(J)-S2/N
  )
400:NEXT J
410:SX=J(XX/N)
420:SY=J(YY/N)
430:R=XY/(N*SX*SY)
440:AA=SX/SY
450:BB=S2/N-AA*S1/
  N
460:LINE (0,BB*Y)-
  (214,-(AA*214/X
  +BB)*Y)
470:GLCURSOR (0,0)
  :TEXT:LF 3
490:LPRINT "Sxx=";
  SX
500:LPRINT "Syy=";
  SY
510:LPRINT "Sxy=";
  XY
520:LPRINT "a=";AA
530:LPRINT "b=";BB
540:LPRINT "Cor.Co
  ef(R)=",R:LF 1
550:LPRINT "
  -END---":LF 4
560:END

STATUS (1)
1200

~~~~~
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MAY 1984 SEAFDEC
~~~~~

```

RESULT OF PRINTOUT
PROG.-S75

MAX X= 70
MAX Y= 67

MEAN X= 43.5
MEAN Y= 42.2

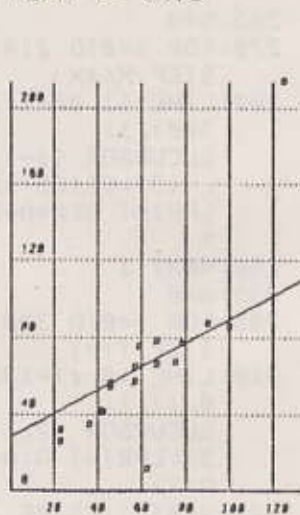


Sxx= 17.89553017
Syy= 15.78480282
Sxy= 2608
a= 1.133718956
b=-7.116774586
Cor. Coef(R)= 9.232
596522E-01

---END---

MAX X= 123
MAX Y= 212

MEAN X= 59.1
MEAN Y= 64.3



Sxx= 24.08505761
Syy= 39.18686004
Sxy= 15606.4
a= 6.146207577E-01
b= 27.97591322
Cor. Coef(R)=
8.267697592E-01

---END---

MAX X= 92
MAX Y= 90

MEAN X= 49.3
MEAN Y= 49.4



Sxx= 25.49137109
Syy= 24.06324999
Sxy= 6073.8
a= 1.059348637
b=-2.825887804
Cor. Coef(R)=
9.901773986E-01

---END---

11. Significance of correlation coefficient - PROG.-S30

```

5:REM PROG.-S30
6:REM DEF -B-
7:REM *****
  *SIGNIFICANCE*
  *OF CORR. COEF.
8:REM -----*
  * TEST OF *
  * r=0 OR NOT? *
  * *****
9:REM T-TABLE of
  PHJ=n-2 is nes
  sesary.
10:"B":CLEAR
12:LPRINT "See T-
  TAB(PHJ=n-2)an
  d check T belo
  w.";LF 3
20:BEEP 3:INPUT "
  No. of DATA N=?
  ";N
30:BEEP 3:INPUT "
  CORR. COEF. R=?
  ";R
35:LPRINT "N=";N:
  LPRINT "R=";R
40:LPRINT "T=";R*
  J((N-2)/(1-R*R
  ))
50:LPRINT "DEG. of
  Freed.=";N-2
60:LF 1:CLEAR :
  INPUT " END
  =1, NEXT=2 ?";
  P: IF P=3GOTO
  60
70: IF P=2GOTO 20
80:END
  
```

~~~~~  
 RESULT OF PRINTOUT  
 ~~~~~

See T-TAB(PHJ=n-2)
 and check T below.

N= 105
 R= 0.32
 T= 3.427892302
 DEG. of Freed.= 103

N= 155
 R= 0.45
 T= 6.232939096
 DEG. of Freed.= 153

N= 400
 R= 0.29
 T= 6.045267242
 DEG. of Freed.= 398

N= 246
 R= 0.41
 T= 7.021715155
 DEG. of Freed.= 244

~~~~~

STATUS (1)

424

~~~~~  
 By S. SHINDO
 MAR. 1984 SEAFDEC
 ~~~~~

12. Linear regression: graph, plot and estimation - PROG.-S03

```

5:REM PROG.-S03
6:REM DEF -A-
7:REM *****
* LINEAR *
* REGRESSION *
8:REM -----*
* GRAPH, PLOT *
* ESTIMATION *
*****
10:"A":CLEAR:
TEXT:WAIT 0:
CLS
12:BEEP 5:WAIT 10
0:PRINT "
** DATA KEY-IN
**":WAIT 0
15:BEEP 3:INPUT "
No. of DATA=?";
F
20:DIM X(F-1), Y(F
-1)
30:FOR I=0 TO F-1
40:CLS :A$="X("+"
STR$ (I+1)+")="
50:PRINT A$;
60:BEEP 1:INPUT X
(I)
70:CLS :B$="Y("+"
STR$ (I+1)+")="
80:PRINT B$;
90:BEEP 1:INPUT Y
(I)
100:BEEP 2:NEXT I:
WAIT
110:CLS :BEEP 0:
PRINT "KEYIN E
ND:Press DEF-S
-ENT."
120:"S":I=0:J=0:K=
0:L=0:M=0
130:P=10^(98):Q=-P
:R=P:Q=Q
140:FOR B=1 TO F
150:Z=B-1
160:I=I+X(Z)
170:J=J+Y(Z)
180:K=K+X(Z)*Y(Z)
190:L=L+X(Z)*Y(Z)
200:M=M+Y(Z)*Y(Z)
210:IF P>X(Z)LET P
=X(Z)
220:IF Q<X(Z)LET Q
=X(Z)
230:IF R>Y(Z)LET R
=Y(Z)
240:IF Q<Y(Z)LET Q
=Y(Z)
250:NEXT B
260:I=I/F:J=J/F
270:K=K-F*I*I
280:L=L-F*I*J
290:M=M-F*J*J
300:H=J/(K*M)
305:H=L/H
308:CLS :BEEP 2:
WAIT 0:PRINT "
** PRINT
ING **":WAIT
310:LPRINT "VARIAN
CE=", L/(F-1)
320:LPRINT "CORREL
ATION=", H:LF 1
330:LPRINT " **REG
RES. COEFF. **":
LF 1
340:S=L/K:T=J-S*I
350:LPRINT " A=";
S
360:LPRINT " B=";
T:LF 1
370:LPRINT " *
* MEAN **":LF
1
380:LPRINT " X=";
I
390:LPRINT " Y=";
J:LF 4
400:BEEP 0:INPUT "
GRAPH: YES=1,
NO=2 ?":UU:IF
UU>=3GOTO 400
410:IF UU=1 THEN 50
0
420:IF UU=2 END
500:GRAPH
510:A=(Q-P)/200
520:B=(Q-R)/350
530:C=(I-P)/A
540:D=(R-J)/B
550:GLCURSOR (C,D)
560:SORGN
570:X1=-(I-P)/A:Y1
=0
580:X2=(Q-I)/A:Y2=
0
590:GOSUB 900
600:LINE (X2-10,Y2
-6)-(X2,Y2)
605:LINE (X2,Y2)-(
X2-10,Y2+6)
610:GLCURSOR (X2+3
,Y2-6):LPRINT
"X"
620:LINE (X2+1,Y2+
12)-(X2+15,Y2+
12)
630:X1=0:Y1=-(J-R)
/B
640:X2=0:Y2=(Q-J)/
B
650:GOSUB 900
660:LINE (X2-6,Y2-
10)-(X2,Y2)
665:LINE (X2,Y2)-(
X2+6,Y2-10)
670:GLCURSOR (X2-4
,Y2+5):LPRINT
"Y"
680:LINE (X2-5,Y2+
22)-(X2+7,Y2+2
2)
690:FOR E=1 TO F
700:X=(X(E-1)-I)/A
:Y=(Y(E-1)-J)/
B
710:GOSUB 920
720:NEXT E
725:X1=-(I-P)/A
730:Y1=((S*I+T)-J)
/B
740:X2=(Q-I)/A:Y2=
((S*Q+T)-J)/B
760:GOSUB 900
770:F=1
780:BEEP 3:INPUT "
ESTIMATION=";X
(F-1):GOTO 800

```

```

790: GOTO 840
800: Y(F-1)=S*X(F-1)
      +T
810: X=(X(F-1)-I)/A
      : Y=(Y(F-1)-J)/B
820: LINE (X-3, Y-3)
      -(X+3, Y+3), , B
830: F=F+1: GOTO 780
840: GLCURSOR (-(1-
      P)/A, -(J-R)/B-
      20)
850: IF F=1END
852: TEXT
860: LF 1: LPRINT "
      *ESTIMATION
      *": LF 1
870: FOR W=1TO F-1
880: LPRINT "X="; X(
      W-1)
890: LPRINT "Y="; Y(
      W-1)
892: LF 1
895: NEXT W
896: LF 1: LPRINT "
      ----END----"
897: LF 4: END
899: REM *SUBPROG.*
900: LINE (X1, Y1)-(
      X2, Y2)
910: RETURN
920: GLCURSOR (X, Y)
      : LPRINT "*"
930: RETURN
940: END

```

STATUS (1)

1951

```

*****
REARRANGED BY
S. SHINDO
MAR. 1984 SEAFDEC
*****

```

\*\*\*\*\*  
RESULT OF PRINTOUT  
\*\*\*\*\*

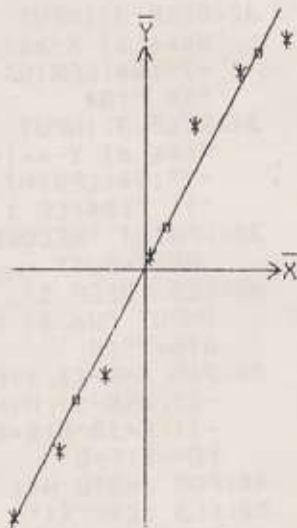
VARIANCE= 375  
CORRELATION= 0.988135527

\*\*\*REGRES. COEFF.\*\*\*

A= 8.835714286E-  
01  
B= 12.28571429

\*\*\* MEAN \*\*\*

X= 40  
Y= 44.42857143



\*ESTIMATION\*

X= 25  
Y= 32.37500001

X= 45  
Y= 48.44642858

X= 65  
Y= 64.51785715

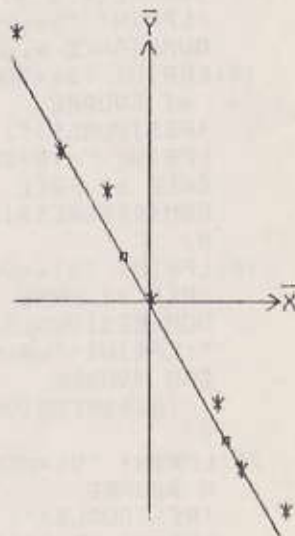
----END----

\*\*\*REGRES. COEFF.\*\*\*

A=-8.838806832  
B= 821.2542781

\*\*\* MEAN \*\*\*

X= 40.71428571  
Y= 461.7142857



13. Linear regression: conformity, predictive limit and graph - PROG.-S04

```

5:REM PROG.-S04
6:REM DEF -K-
7:REM *****
  * LINEAR *
  * REGRESSION *
8:REM -----*
  *CONF. & PRED. *
  *LIMITS, GRAPH*
  *****
10:"K":CLEAR:
  LPRINT "(1) DE
  F -L-":LF 1:
  LPRINT " y=
  b0+b1*x":LF 1
12:LPRINT "b0, b1=
  CONSTANTS":
  LPRINT "r=CORR
  ALATION
  COEFFICIENT"
13:LPRINT "r^2=DE
  TERMINATION
  COEF. of r
14:LPRINT "Sxx &
  Syy=SUM of
  SQUARE(x & y)"
  LPRINT "Sxy=C
  OVARJANCE x, y"
16:LPRINT "Se=SUM
  of SQUARE
  (RESIDUALS)":
  LPRINT "dfe=DE
  GREE of FREE
  DOM(REGRESSIO
  N)
18:LPRINT "dfe=DE
  GREE of FREE
  DOM(RESIDUALS)
  ":LPRINT "UR=M
  EAN SQUARE
  (REGRESSION
  )
20:LPRINT "Ue=MEA
  N SQUARE
  (RESIDUALS)":
  LPRINT "F=RATI
  O of VARIANCE":
  LF 1
22:LPRINT "(2) DE
  F -M-":LPRINT
  " PLOT, ESTIM
  ATION and GR
  APH"
24:LPRINT " * = P
  LOT of INPUT
  DATA":
  LPRINT " Small
  BOXes denotes
  ESTIMATED Y"
26:LPRINT "H THICK
  LINE shows CO
  NFIDENCE RANGE
  ":LPRINT "H FI
  NE LINE shows
  EXPECTED RANGE
27:LF 1:LPRINT "(
  NOTE) t-distrib
  ution TABLE i
  s necessary. t
  (n-2, 0.05)":
  LF 1
28:LPRINT " -----
  -----":
  LF 3:END
30:"L":CLEAR:
  WAIT 0:CLS:
  CSIZE 2
32:BEEP 3:INPUT "
  Name of X-axis
  =?":A$:LPRINT
  "X: ";A$
34:BEEP 3:INPUT "
  Name of Y-axis
  =?":B$:LPRINT
  "Y: ";B$:LF 1
35:LPRINT "RECORD
  OF INPUT"
36:CLS:BEEP 5:
  INPUT "No. of D
  ATA=?":N
38:DIM X(N-1), Y(N
  -1), W(N-1), H(N
  -1):E=10^8:G=E
  :D=-E:F=D
40:FOR J=0 TO N-1
48:CLS:C$="X("+
  STR$(J+1)+")=
  "
60:PRINT C$:
70:INPUT X(J):
  GOTO 90
80:N=J:GOTO 160
90:CLS:C$="Y("+
  STR$(J+1)+")=
  "
100:PRINT C$:
110:INPUT Y(J)
112:IF D<X(J)LET D
  =X(J)
114:IF E>X(J)LET E
  =X(J)
116:IF F<Y(J)LET F
  =Y(J)
118:IF G>Y(J)LET G
  =Y(J)
120:D=D+X(J):P=P+Y
  (J)
130:D=D+X(J)*X(J):
  R=R+Y(J)*Y(J):
  S=S+X(J)*Y(J)
140:CSIZE 1:LPRINT
  X(J), Y(J)
150:NEXT J
160:CSIZE 2:LF 1:X
  =D/N:Y=P/N
170:T=D-N*X*X
180:U=S-N*X*Y
190:U=R-N*Y*Y
200:C=U/T(T*U)
210:B=U/T
215:A=Y-B*X
220:CLS:D$="y=b0+
  b1*x"
225:LPRINT D$
230:LPRINT "b0=";A
240:LPRINT "b1=";B
250:LPRINT "r=";C
255:LPRINT "r^2=";
  C*C
260:LPRINT "Sxx=";
  T
270:LPRINT "Sxy=";
  U
280:LPRINT "Syy=";
  U
290:D=C*C*U:P=(1-C
  *C)*U
300:D=1:R=N-2
310:S=P/D
320:LPRINT "SR=";D

```

```

325:LPRINT "Se=";P
330:LPRINT "dfr=";
  0
335:LPRINT "dfe=";
  R
340:LPRINT "UR=";0
  /0
345:LPRINT "Ue=";P
  /R
350:LPRINT "F=";(0
  *R)/(0*P):END
355:REM *****
360:"M":M=F/300
370:IF E>=0LET Z=2
  5:L=D/175:GOTO
  390
380:L=(D+ABS E)/20
  0:Z=ABS E/L+5
390:GRAPH :
  GLCURSOR (Z,-4
  00):SORGN
400:LINE (-Z,0)-(2
  10-Z,0):
  GLCURSOR (175,
  -15):LPRINT "X
  "
410:LINE (0,-50)-(
  0,350):
  GLCURSOR (-15,
  340):LPRINT "Y
  "
420:GLCURSOR (-15,
  -15):LPRINT "0
  "
430:FOR J=0TO N-1
440:J=X(J)/L:K=Y(J
  )/M
450:GLCURSOR (J-4,
  K-5):LPRINT "*"
  "
460:NEXT J
470:J=0:K=A/M
480:J1=J90:K1=(A+B
  *(J)*L)/M:IF
  K1>350GOTO 500
490:LINE (J,K)-(J1
  ,K1)
500:I=J
510:BEEP 10:INPUT
  "t(n-2,0.05)="

```

```

;S
520:IF I>=NTHEN 65
  0
530:CLS :INPUT "ES
  TIMATION: X=";
  X(J):GOTO 550
540:N=J:GOTO 650
550:J=X(J)/L:Y(J)=
  A+B*X(J):K=Y(J
  )/M
560:IF K>350GOTO 6
  40
570:LINE (J-4,K-4)
  -(J+4,K+4),0,,
  B
580:W(J)=J((J)/N+(X
  (J)-X)^2/I)*P/
  R)
590:K=(Y(J)+S*W(J)
  )/M:K1=(Y(J)-S
  *W(J))/M
600:LINE (J-2,K)-(
  J+2,K1),0,,B
610:H(J)=J((J+1)/N+
  (X(J)-X)^2/I)*
  P/R)
620:K=(Y(J)+S*H(J)
  )/M:K1=(Y(J)-S
  *H(J))/M
630:LINE (J-1,K)-(
  J+3,K)-(J-1,K)
  -(J-1,K1)-(J+3
  ,K1)-(J-1,K1),
  0
640:I=J+1:GOTO 520
650:GLCURSOR (0,-1
  00):TEXT
660:LPRINT " **ES
  TIMATION**":LF
  1
670:J=J
675:IF W(J)=0GOTO
  730
680:LPRINT "X=";X(
  J)
690:LPRINT "Y=";Y(
  J)
700:LPRINT "Y0 UPP
  ER Conf.Lim=";

```

```

Y(J)+S*W(J):
LPRINT "Y0 LOW
ER Conf.Lim=";
Y(J)-S*W(J)
710:LPRINT "Y0 UPP
ER Pred.Lim=";
Y(J)+S*H(J):
LPRINT "Y0 LOW
ER Pred.Lim=";
Y(J)-S*H(J):LF
  1
720:J=J+1:GOTO 675
730:LF 1:LPRINT "-
  -----END-----
  --":LF 4
740:END

```

STATUS (J)

2834

\*\*\*\*\*

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\*\*\*\*\*

RESULT OF PRINTOUT

PROG.-S04

(1) DEF -L-

$$y=b0+b1*x$$

b0,b1=CONSTANTS  
r=CORRELATION  
COEFFICIENT  
r^2=DETERMINATION  
COEF. of r  
Sxx & Syy=SUM of  
SQUARE(x & y)  
Sxy=COVARIANCE x,y  
Se=SUM of SQUARE  
(RESIDUALS)  
dfr=DEGREE of FREE  
DOM(REGRESSION)  
dfe=DEGREE of FREE  
DOM(RESIDUALS)  
VR=MEAN SQUARE  
(REGRESSION)  
Ve=MEAN SQUARE  
(RESIDUALS)  
F=RATIO of VARIANCE

(2) DEF -M-  
PLOT, ESTIMATION  
and GRAPH  
\* = PLOT of INPUT  
DATA  
Small BOXes denot  
es ESTIMATED Y  
#THICK LINE shows  
CONFIDENCE RANGE  
# FINE LINE shows  
EXPECTED RANGE

(NOTE) t-distribut  
ion TABLE is neces  
sary.  $t(n-2, 0.05)$

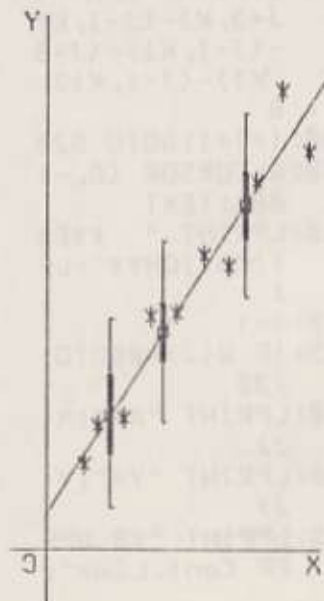
X: AGE OF FISH  
Y: FORK LENGTH

RECORD OF INPUT

|      |      |
|------|------|
| 13.3 | 19   |
| 20   | 22.1 |
| 18   | 23.4 |
| 40   | 41.3 |
| 70   | 42   |
| 10   | 32.4 |
| 70   | 39.5 |
| 70   | 65.2 |
| 10   | 31.5 |
| 100  | 70.3 |

$y=b0+b1*x$   
b0= 6.10547167  
b1= 7.261755507E-0  
1  
r= 9.679265252E-01  
r^2= 9.360017502E-  
01  
Sxx= 7790.201  
Sxy= 5662.921  
Syy= 4389.321  
SR= 4112.274776  
Se= 277.0462243  
dfr= 1  
dfe= 8  
VR= 4112.274776  
Ve= 34.63077804  
F= 118.7462428

-----DEF M-----



\*\*ESTIMATION\*\*

X= 25  
Y= 24.25986044  
Y0 UPPER Conf.Lim=  
31.42864237  
Y0 LOWER Conf.Lim=  
17.09107851  
Y0 UPPER Pred.Lim=  
41.15647235  
Y0 LOWER Pred.Lim=  
7.363248534

X= 45  
Y= 38.78337145  
Y0 UPPER Conf.Lim=  
43.95435257  
Y0 LOWER Conf.Lim=  
33.61239033  
Y0 UPPER Pred.Lim=  
54.93400937  
Y0 LOWER Pred.Lim=  
22.63273353

X= 76  
Y= 61.29481352  
Y0 UPPER Conf.Lim=  
67.29392973  
Y0 LOWER Conf.Lim=  
55.29569731  
Y0 UPPER Pred.Lim=  
77.72933374  
Y0 LOWER Pred.Lim=  
44.8602933

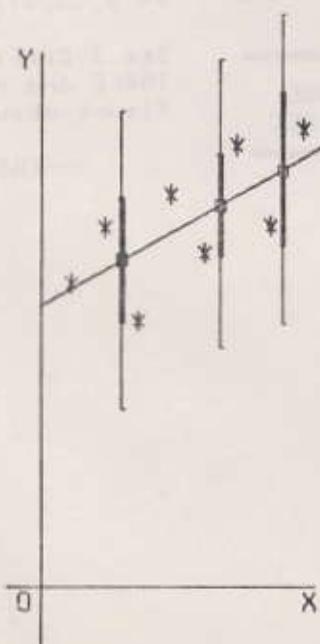
-----END-----

X: AGE OF FISH  
Y: TOTAL LENGTH

RECORD OF INPUT

|    |      |
|----|------|
| 19 | 55   |
| 22 | 55   |
| 19 | 49   |
| 19 | 71.7 |
| 19 | 62.5 |
| 22 | 89   |
| 22 | 85.4 |
| 22 | 82.8 |

$y = b_0 + b_1 * x$   
 $b_0 = 50.93571429$   
 $b_1 = 3.339285714E-01$   
 $r = 6.929974822E-01$   
 $r^2 = 4.802455103E-01$   
 $S_{xx} = 4200$   
 $S_{xy} = 1402.5$   
 $S_{yy} = 975.19875$   
 $SR = 468.3348214$   
 $Se = 506.8639286$   
 $dfR = 1$   
 $dfe = 6$   
 $UR = 468.3348214$   
 $Ue = 84.47232143$   
 $F = 5.543911827$



\*\*ESTIMATION\*\*

$X = 25$   
 $Y = 59.28392858$   
 $Y0 \text{ UPPER Conf.Lim} = 70.67121424$   
 $Y0 \text{ LOWER Conf.Lim} = 47.89664292$   
 $Y0 \text{ UPPER Pred.Lim} = 86.08722336$   
 $Y0 \text{ LOWER Pred.Lim} = 32.4001338$

$X = 55$   
 $Y = 69.30178572$   
 $Y0 \text{ UPPER Conf.Lim} = 78.66207688$   
 $Y0 \text{ LOWER Conf.Lim} = 59.94149456$   
 $Y0 \text{ UPPER Pred.Lim} = 95.30924984$   
 $Y0 \text{ LOWER Pred.Lim} = 43.2943216$

$X = 74$   
 $Y = 75.64642857$   
 $Y0 \text{ UPPER Conf.Lim} = 89.48447231$   
 $Y0 \text{ LOWER Conf.Lim} = 61.80838483$   
 $Y0 \text{ UPPER Pred.Lim} = 103.5796452$   
 $Y0 \text{ LOWER Pred.Lim} = 47.7132119$

-----END-----

14. Rejection method (normal population) - PROG.-S20

```

5:REM PROG.-S20
6:REM DEF -A-
7:REM *****
  * REJECTION *
  * METHOD for *
  * Abnormal Data
  *****
8:REM T-Distribu
  tion TABLE is
  necessary.
10:"A":CLEAR:
  CSIZE 2:LPRINT
  "(NOTES)"
11:LPRINT "T-dist
  ribut. TABLE is
  necessary."
12:LPRINT "TEST D
  ATA denotes ab
  normal ? figur
  e, which should
  be"
13:LPRINT "includ
  ed in input da
  ta.":LF 4
20:BEEP 3:INPUT "
  No. of DATA=?";
  N
25:DIM X(N-1):
  WAIT 0
30:FOR J=0TO N-1
40:CLS :A$="DATA(
  "+STR$(J+1)+"
  )="
50:PRINT A$;
60:INPUT X(J)
65:T=T+X(J):S=S+X
  (J)*X(J)
70:NEXT J:CLS
80:INPUT "TEST DA
  TA=?";X:GOTO 9
  0
85:END
90:T=T/N:S=S/(N-
  T*T):LF -4
100:WAIT:CSIZE 1:
  LF 5:LPRINT "
  *** RECORD
  OF INPUT DATA
  ***":LF 2
  
```

```

110:FOR J=0TO N-1
  STEP 2
115:ON ERROR GOTO
  132
120:LPRINT TAB 5;X
  (J);TAB 20;X(J
  +1)
130:NEXT J
132:CSIZE 2:TEXT:
  LF 2
140:LPRINT "TEST D
  ATA=";X
150:LPRINT "T=";
  ABS (X-T)/S:LF
  1
160:LPRINT "See T-
  Distribution TA
  BLE and check
  T figure above
  .":LF 1
165:LPRINT "
  --END--":LF 4
  :CSIZE 2
170:END
  
```

STATUS (J) 770

~~~~~  
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 MAR.1984 SEAFDEC
 ~~~~~

~~~~~  
 RESULT OF PRINTOUT
 PROG.-S20
 ~~~~~

(NOTES)  
 T-distrib. TABLE  
 is necessary.  
 TEST DATA denotes  
 abnormal ? figure,  
 which should be  
 included in input  
 data.

\*\*\* RECORD OF INPUT DATA \*\*\*

|      |      |
|------|------|
| 4500 | 5000 |
| 4500 | 5000 |
| 4500 | 5500 |
| 5000 | 6000 |
| 5000 | 5500 |
| 4500 | 6000 |
| 4500 | 5500 |

TEST DATA= 9000  
 T= 3.152615342

See T-Distribution  
 TABLE and check T  
 figure above.

---END---

15. Rejection limits (normal population) - PROG.-S09

```

5:REM PROG.-S09
6:REM DEF -L-
7:REM *****
  * REJECTION *
  * LIMITS *
  *****
10:"L":CLEAR
12:LPRINT "LIM.=X
  M+(-)u*f((N+1)
  *F)/N)":LF 1
14:LPRINT "XM=MEA
  N of Xi":
  LPRINT "u=f of
  UNBIASED ESTI
  MATOR OF U, i.
  e."
15:LPRINT " u=f(
  SX^2/(N-1))"
16:LPRINT "F(PH11
  =1,PH12=N-1)":
  LF 1
18:LPRINT "F-TABL
  E necessary.":
  LF 3
20:BEEP 3:INPUT "
  No.of DATA=?":
  N
30:LPRINT "See T-
  TABLE (PH11=1,
  PH12="+STR$ (N
  -1)+")":LF 3
35:DIM X(N-1)
40:BEEP 3:INPUT "
  F=?":F:WAIT 0
45:FOR I=0 TO N-1
50:CLS :A$="DATA
  X("+STR$ (I+1)
  +")="
52:PRINT A$:
54:BEEP 1:INPUT X
  (I)
56:NEXT I
60:FOR I=0 TO N-1
65:S=S+X(I)
66:SS=SS+X(I)^2
70:NEXT I
80:SX=SS-N*(S/N)^
  2
90:U=f(SX/(N-1))

```

```

92:LPRINT "N=";N
94:LPRINT "u=";U
98:LPRINT "MEAN="
  :S/N
100:LPRINT "UPPER
  LIMIT=", (S/N)+
  U*f(((N+1)*F)/
  N)
110:LPRINT "LOWER
  LIMIT=", (S/N)-
  U*f(((N+1)*F)/
  N)
115:LF 4
120:END

```

STATUS (1)

691

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APR.1984 SEAFDEC

RESULT OF PRINTOUT

LIM.=XM+(-)u\*f((N+1)\*F)/N)

XM=MEAN of Xi  
u=f of UNBIASED ES  
TIMATOR OF U, i.e.  
u=f(SX^2/(N-1))  
F(PH11=1,PH12=N-1)

F-TABLE necessary.

See T-TABLE (PH11=  
1,PH12=14)

N= 15  
u= 1.889822392  
MEAN= 55  
UPPER LIMIT=  
59.26726192  
LOWER LIMIT=  
50.73273808

N= 10  
u= 1.776388347  
MEAN= 9.4  
UPPER LIMIT=  
13.35221457  
LOWER LIMIT=  
5.447785429

16. Walford graph (estimation of limit of body length) - PROG.-S69

```

5:REM PROG.-S69
6:REM DEF -A-
7:REM *****
  * WALFORD *
  * GRAPH *
  * ESTIMATION *
8:REM OF *
  * LIMIT LENGTH *
  *****
10:"A":CLEAR :
  TEXT
12:BEEP 3:INPUT "
SPECIES(16c)="
;S$:LPRINT S$
15:BEEP 3:INPUT "
ITEM (16c)=";I
$:LPRINT I$
18:BEEP 5:WAIT 20
0:PRINT "*** D
IGIT of DATA (
= 4 ***":WAIT
20:BEEP 3:INPUT "
No. of DATA=?";
N:LPRINT "N=";
N:LF 1:WAIT 0
22:DIM X(N-1),Y(N
-1)
25:FOR J=1TO N-1
30:CLS :A$="(Ln,X
)YEAR("+STR$(
I)+")="
40:PRINT A$;
50:BEEP 2:INPUT X
(I)
60:NEXT I
62:BEEP 10
65:FOR J=1TO N-1
70:CLS :A$="(Ln+1
,Y)YEAR("+STR$(
I+1)+")=?"
80:PRINT A$;
90:BEEP 2:INPUT Y
(I)
100:NEXT I:BEEP 3
105:REM *****
110:LPRINT "--RECO
RD OF DATA--":
LF 1
115:LPRINT " Ln+1":LF
1
120:FOR J=1TO N-1
130:LPRINT TAB 2;X
(I):LF -1:
LPRINT TAB 10;
Y(I)
140:NEXT J:LF 3
145:REM *****
150:FOR J=1TO N-1
152:S1=S1+X(I)
154:S2=S2+X(I)^2
156:S3=S3+Y(I)
158:S4=S4+X(I)*Y(I)
160:NEXT J
170:SX=SX+S2-(N-1)
*(S1/(N-1))^2
180:SYX=SYX+S4-(N-
1)*(S1/(N-1))*
(S3/(N-1))
190:A=SYX/SX:
LPRINT "A=";A
200:B=S3/(N-1)-A*(
S1/(N-1)):
LPRINT "B=";B:
LF 2
205:REM *****
210:GRAPH :
GLCURSOR (0,-2
14):SORGN
220:LINE (0,214)-(
0,0)-(214,0)
230:LINE (0,0)-(21
4,214)
240:GLCURSOR (0,21
9):LPRINT "Ln+
1":GLCURSOR (1
85,-18):LPRINT
"Ln"
250:FOR J=1TO N-1
260:IF MX<X(I)LET
MX=X(I)
265:IF MY<Y(I)LET
MY=Y(I)
268:NEXT J
270:FOR J=1TO N-1
274:M1=214/MX/1.5
275:M2=214/MY/1.5
276:MM=(M1+M2)/2
279:FOR J=0TO 2
280:LINE (X(I)*MM+
3,Y(I)*MM+3)-(
X(I)*MM-3,Y(I)
*MM-3),,B
281:NEXT J
290:NEXT I
300:LINE (0,B*MM)-(
214,(A*214+B*
MM))
310:LINE ((B*MM/(M
M-A*MM))*MM,0)
-((B*MM/(MM-A*
MM))*MM,214),2
315:GLCURSOR ((B*M
M/(MM-A*MM))*M
M-15,219):
LPRINT "LIM."
320:GLCURSOR (0,0)
:TEXT :LF 3:
LPRINT "LIMIT(
MAX) LENGTH="
330:LIM=B*MM/(MM-A
*MM):LPRINT LI
M:LF 2
340:LPRINT " -
--END---":LF 4
350:END

STATUS (1)
1424

~~~~~
By S.SHINDO
MAY 1984 SEAFDEC
~~~~~

```

RESULT OF PRINTOUT

PROG. -S69

SEA BREAM  
BODY LENGTH  
N= 8

YELLOW TAIL  
OPERCULUM  
N= 6

--RECORD OF DATA--

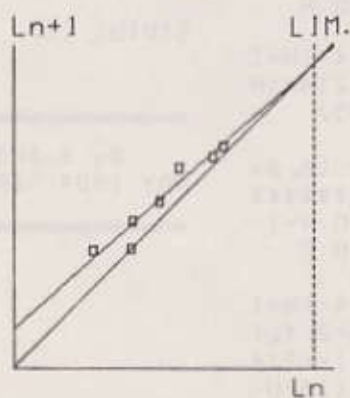
--RECORD OF DATA--

| Ln   | Ln+1  |
|------|-------|
| 40.2 | 59.2  |
| 53.2 | 60    |
| 60   | 73.6  |
| 73.6 | 83.4  |
| 83.4 | 99.9  |
| 99.9 | 105   |
| 105  | 110.3 |

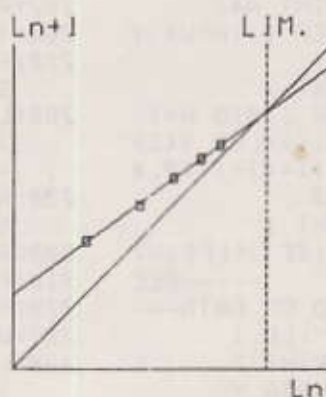
| Ln   | Ln+1 |
|------|------|
| 29   | 49.5 |
| 49.5 | 63.4 |
| 63.4 | 73.9 |
| 73.9 | 81.3 |
| 81.3 | 86.5 |

A= 8.687778462E-01  
B= 19.78658697

A= 7.113588433E-01  
B= 28.65105753



LIMIT(MAX) LENGTH=  
150.7869395



LIMIT(MAX) LENGTH=  
99.26185807

---END---

---END---

17. Dominancy of fauna (semi-log plotting) - PROG.-S52

```

5:REM PROG.-S52
6:REM DEF -A-
7:REM *****
  * DOMINANCY *
  * OF FAUNA *
8:REM -----
  * SEMI-LOG *
  * PLOTTING *
  *****
10:"A":CLEAR :
  TEXT
15:LPRINT " Y =
  A EXP (B*X)":
  LF 1
20:BEEP 3:INPUT "
  No. of DATA=?";
  N
30:BEEP 3:WAIT 15
  0:PRINT " * DI
  GITS of DATA=1
  -999 *":WAIT 0
40:DIM X(N), Y(N),
  YL(N)
50:FOR J=0 TO N-1
60:CLS :A$="DATA
  Y("+STR$ (J+1)
  +")="
70:PRINT A$;
80:BEEP 1:INPUT Y
  (J)
90:NEXT J
100:FOR J=0 TO N-1
110:YL(J)=LOG Y(J)
115:X(J)=(J+1)*0.4
  343
120:NEXT J
130:CSIZE 1:LPRINT
  " -----REC
  ORD OF DATA---
  --":LF 1
140:LPRINT "
  DATA Y
  LOG DATA Y":LF
  1
150:FOR J=0 TO N-1
160:LPRINT TAB 1;J
  +J:LF -J:
  LPRINT TAB 9;Y
  (J):LF -J:
  LPRINT TAB 10;
  YL(J)
170:NEXT J
180:CSIZE 2:LF 3:
  CLS
190:GRAPH :
  GLCURSOR (0,-3
  00):SORGN
200:LINE (0,305)-(
  0,0)-(214,0)
210:GLCURSOR (0,31
  0):LPRINT "LOG
  Y":GLCURSOR (
  195,-17):
  LPRINT "X"
220:LO=1:FOR J=1 TO
  3:FOR J=1 TO 9
230:LINE (0,LOG (J
  *LO)*100)-(214
  ,LOG (J*LO)*10
  0)
240:NEXT J:LO=LO*1
  0:NEXT J
250:GLCURSOR (0,0)
260:WAIT 0:BEEP 3:
  B$="N="+STR$ N
  +":Interval X=
  "
262:PRINT B$;
264:INPUT E
270:FOR J=0 TO N
  STEP E
280:LINE (214/(N+1
  )*J,0)-(214/(N
  +1)*J,295)
290:NEXT J:
  GLCURSOR (0,0)
300:REM *****
310:FOR J=0 TO N-1
320:FOR J=0 TO 2
325:U=0.4343
330:LINE (214/(N+1
  )*X(J)/U+2, YL(
  J)*100+2)-(214
  /(N+1)*X(J)/U-
  2, YL(J)*100-2)
  , , B
340:NEXT J
350:NEXT J
360:GLCURSOR (0,0)
365:REM *****
370:FOR J=0 TO N-1
380:S1=S1+X(J)
390:S2=S2+X(J)^2
400:S3=S3+X(J)*YL(
  J)*100
410:S4=S4+YL(J)*10
  0
420:NEXT J
430:SYX=S2-N*(S1/N)
  ^2
440:SYX=S3-N*(S1/N
  )*(S4/N)
450:A=SYX/SX
452:B=S4/N-A*S1/N
454:LINE (0,B)-(21
  4,B+A*N*U*1.00
  64)
460:AA=-A/100*0.43
  43
470:GLCURSOR (0,0)
  :TEXT :LF 3:
  LPRINT "DOMINA
  NCY(-/+,*100)=
  ";AA:LF 2
480:LPRINT " -
  --END---":LF 4
490:END

STATUS (1)
1352

~~~~~
By S. SHINDO
MAY 1984 SEAFDEC
~~~~~

```

RESULT OF PRINTOUT  
PROG. -552

$$Y = A \exp(BX)$$

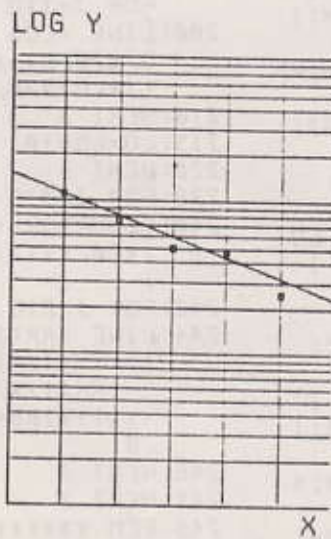
$$Y = A \exp(BX)$$

-----RECORD OF DATA-----

|   | DATA Y | LOG DATA Y  |
|---|--------|-------------|
| 1 | 118    | 2.071392683 |
| 2 | 73     | 1.86281724  |
| 3 | 58     | 1.763428084 |
| 4 | 43     | 1.633212514 |
| 5 | 23     | 1.357948885 |

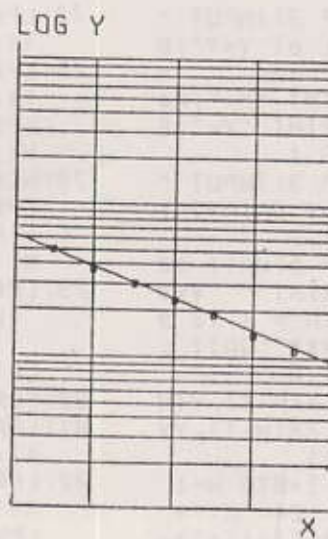
-----RECORD OF DATA-----

|   | DATA Y | LOG DATA Y  |
|---|--------|-------------|
| 1 | 38     | 1.579578884 |
| 2 | 27     | 1.431363724 |
| 3 | 20     | 1.30213253  |
| 4 | 13     | 1.11327836  |
| 5 | 10     | 1.000000001 |
| 6 | 14     | 1.146128826 |
| 7 | 11     | 1.041392683 |



DOMINANCY(-/+, \*100  
)= 1.508754108E-01

---END---



DOMINANCY(-/+, \*100  
)= 1.076873926E-01

---END---

18. Allometry formula (relative growth) - PROG.-S55

```

5:REM PROG.-S55
6:REM DEF -Z-
7:REM *****
  * ALLOMETRY *
  * FORMULA *
8:REM -----*
  * (RELATIVE) *
  * (GROWTH) *
  * *****
10:"Z":CLEAR:
  TEXT:CSIZE 2:
  LPRINT "      Y="
  B*X^A":LF 1:
  LPRINT "A=Rela
    tive Growth
    Coefficient."
12:LPRINT "B=Cons
    tant.":LF 3
20:BEEP 3:INPUT "
  Name of X=?":A$
22:BEEP 3:INPUT "
  Name of Y=?":B$
  :LF -2
24:LPRINT "X=":A$
  :LPRINT "Y=":B$
  :LF 1
30:BEEP 3:INPUT "
  No. of DATA=?":
  N
32:BEEP 5:WAIT 10
  0:PRINT " ***
    DATA = 1 to 9
    99 ***":WAIT :
  WAIT 0
35:DIM X(N-1),Y(N
  -1),XX(N-1),YY
  (N-1)
40:FOR J=0 TO N-1
42:CLS :C$="X("+
  STR$ (J+1)+")="
  "
44:BEEP 1:PRINT C
  $;
46:INPUT X(J)
48:CLS :C$="Y("+
  STR$ (J+1)+")="
  "
50:BEEP 1:PRINT C
  $;
52:INPUT Y(J)
54:NEXT J
60:FOR J=0 TO N-1
62:XX(J)=LOG X(J)
64:YY(J)=LOG Y(J)
65:NEXT J:CLS
66:BEEP 3:INPUT "
  DATA PRINTOUT:
  Yes=1, No=2?":Q
  Q:IF QQ=360 TO
  66
67:IF QQ=260 TO 10
  0
68:CSIZE 1
70:LPRINT "
  RECORD OF IN
  PUT DATA":LF 1
71:LPRINT "
    X(J)
    Y(J)":LF 1
72:FOR J=0 TO N-1
73:LPRINT TAB 4;J
  +1:LF -1
75:LPRINT TAB 9;X
  (J):LF -1:
  LPRINT TAB 22;
  Y(J)
78:NEXT J:LF 2:
  LPRINT "
  RECORD OF LO
  G. DATA":LF 1
79:LPRINT "
    LOG.X(J)
    LOGY(J)":
    LF 1
80:FOR J=0 TO N-1
81:LPRINT TAB 1;J
  +1:LF -1
82:LPRINT TAB 4;X
  (J):LF -1:
  LPRINT TAB 20;
  YY(J)
86:NEXT J:CSIZE 2
  :LF 4
90:REM --GRAPH--
100:BEEP 3:PAUSE "
  ---- GRAP
  H ----"
110:GRAPH :
    GLCURSOR (0,-3
    00):SORGN
120:LINE (0,305)-(
    0,0)-(214,0)
130:GLCURSOR (0,31
    0):LPRINT "LOG
    .Y":GLCURSOR (
    155,-17):
    LPRINT "LOG.X"
135:LO=1
140:FOR J=1 TO 3:
  FOR J=1 TO 9
150:LINE (0,LOG (J
    *LO)*100)-(207
    ,LOG (J*LO)*10
    0)
160:NEXT J
170:LO=LO*10
180:NEXT J
185:LO=1
190:FOR J=1 TO 3:
  FOR J=1 TO 9
200:LINE (LOG (J*L
    O)*70,0)-(LOG
    (J*LO)*70,295)
210:NEXT J
215:LO=LO*10
220:NEXT J
230:FOR J=0 TO N-1
240:GLCURSOR (XX(J
    )*70,YY(J)*100
    )
242:FOR J=0 TO 2
244:LINE (XX(J)*70
    +3,YY(J)*100-3
    )-(XX(J)*70-3,
    YY(J)*100+3),,
    .B
246:NEXT J
248:NEXT J
249:REM *****
250:FOR J=0 TO N-1
252:SX=XX(J)/N:
  SY=YY(J)/N
254:SZ=SZ+XX(J)*YY
  (J)
256:TX=TX+XX(J)^2:
  TY=TY+YY(J)^2
258:NEXT J

```

```
260: S1=TX-N*SX^2
265: S2=SZ-N*SX*SY
270: AA=S2/S1: BB=SY
    -AA*SX
283: SX=0: SY=0: SZ=0
    : TX=0: TY=0: S1=
    0: S2=0
284: REM *****
290: FOR J=0 TO N-1
292: SX=SX+XX(J)*70
    /N: SY=SY+YY(J)
    *100/N
294: SZ=SZ+XX(J)*70
    *YY(J)*100
296: TX=TX+(XX(J)*7
    0)^2: TY=TY+(YY
    (J)*100)^2
298: NEXT J
300: S1=TX-N*SX^2
302: S2=SZ-N*SX*SY
304: AL=S2/S1: BL=SY
    -AL*SX
309: SX=0: SY=0: SZ=0
    : TX=0: TY=0: S1=
    0: S2=0
310: LINE ((0-BL)/A
    L, 0)-((290-BL)
    /AL, 290)
320: GLCURSOR (0, 0)
    : TEXT : LF 3
330: LPRINT "A="; AA
332: LPRINT "B=Comm
    on Logarithm";
    LPRINT " "+
    STR$ BB: LF 1
340: LPRINT " --
    - END ---": LF
    4
350: END
```

STATUS (1) 2039

\*\*\*\*\*

By S. SHINDO  
APR. 1984 SEAFDEC

\*\*\*\*\*

RESULT OF PRINTOUT  
 PROG.-S50

$$Y=B \cdot X^A$$

A=Relative Growth  
 Coefficient.  
 B=Constant.

X=FORK LENGTH  
 Y=BODY WEIGHT

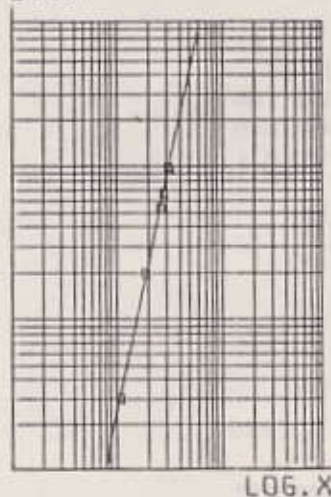
RECORD OF INPUT DATA

|   | X(I) | Y(I) |
|---|------|------|
| 1 | 11   | 3    |
| 2 | 18   | 28   |
| 3 | 25   | 53   |
| 4 | 38   | 87   |
| 5 | 31   | 98   |
| 6 | 32   | 98   |

RECORD OF LOG. DATA

|   | LOG.X(I)    | LOG.Y(I)        |
|---|-------------|-----------------|
| 1 | 1.041352695 | 4.771212547E-01 |
| 2 | 1.278753581 | 1.381823556     |
| 3 | 1.414573349 | 1.72427387      |
| 4 | 1.447158831 | 1.826874883     |
| 5 | 1.431361694 | 1.951226876     |
| 6 | 1.505148878 | 1.982271223     |

LOG. Y



A= 3.289233549  
 B=Common Logarithm  
 -2.933324843

--- END ---

$$Y=B \cdot X^A$$

A=Relative Growth  
 Coefficient.  
 B=Constant.

X=HEAD LENGTH  
 Y=EYE DIAMETER

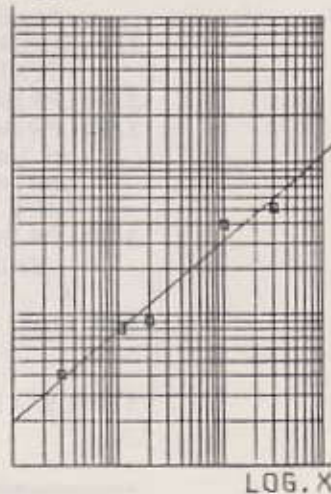
RECORD OF INPUT DATA

|   | X(I) | Y(I) |
|---|------|------|
| 1 | 9    | 4    |
| 2 | 13   | 8    |
| 3 | 28   | 9    |
| 4 | 183  | 18   |
| 5 | 188  | 31   |

RECORD OF LOG. DATA

|   | LOG.X(I)        | LOG.Y(I)        |
|---|-----------------|-----------------|
| 1 | 4.771212547E-01 | 6.82835513E-01  |
| 2 | 1.041352695     | 8.892805587     |
| 3 | 1.381823556     | 9.542423884E-01 |
| 4 | 2.884321374     | 1.301864687     |
| 5 | 2.477121285     | 1.787578176     |

LOG. Y



A= 5.927151718E-01  
 B=Common Logarithm  
 2.861243528E-01

--- END ---

19. Printing format of year column - PROG.-S98

```

5:REM PROG.S98                                TAB 1;B:B=B+1:
6:REM DEF -S-                                  GOTO 300
7:REM *****                                RESULT OF PRINTOUT
   ****PRINTING***                             *****
   * FORMAT OF *
   *YEAR COLUMN *
   *****
10:"S":CLEAR
20:BEEP 3:INPUT "                               TYPE 1=1900
   INITIAL YEAR=?                               1901
";A:B=A                                           ****
30:BEEP 3:INPUT "                               TYPE 2=00
   No.of YEARS(5-                               01
20)=?"N;N                                         **
35:BEEP 3:PAUSE "                               TYPE 3=1900-1901
   See paper, che                               1902-1903
ck TYPE No."                                     *****
40:LPRINT "TYPE 1                               TYPE 4=1900-01
=1900":LPRINT                                   1902-03
"      1901":LPRINT                             *****
LPRINT "                                          TYPE 5=00-01
****"                                             02-03
41:LPRINT "TYPE 2                               *****
=00":LPRINT "
      01":
LPRINT "
**"
42:LPRINT "TYPE 3                               STATUS (1)
=1900-1901":                                     810
LPRINT "
      1902-1903":
LPRINT "
*****"
44:LPRINT "TYPE 4                               By S.SHINDO
=1900-01":                                       FEB.1984 SEAFDEC
LPRINT "
      1902-03":
LPRINT "
*****"
48:LPRINT "TYPE 5                               1970-1971       1970-71       70-71
=00-01":LPRINT                                 1972-1973       1972-73       72-73
"      02-03":                                1974-1975       1974-75       74-75
:LPRINT "                                        1976-1977       1976-77       76-77
****":LF 3                                    1978-1979       1978-79       78-79
50:BEEP 3:INPUT "                               1980-1981       1980-81       80-81
   TYPE No.(1-5)=                               1982-1983       1982-83       82-83
?"P
55:ON PGOTO 60,60
      ,100,100,100
60:FOR I=0TO N-1
70:IF P=1LPRINT

```

20. Total and percentage - PROG.-6(E)

```

3:REM PROG.-6(E)
4:REM DEF --A, B-
5:REM *****
  *TOTAL & % OF*
  * COLUMN, LINE*
  *****
8:"A":BEEP 5:
  WAIT 200:PRINT
  "X-Y TABLE*
  UM, PERCENT ***
  ":BEEP 10
10: CLEAR : INPUT "
  No. of VERTICAL
  COL.=?" : T
20: INPUT "No. of H
  ORIZONT. Col.=?"
  : Y
30: DIM A((T-1), (Y
  -1)):WAIT 0
40:FOR J=0 TO Y-1
50:FOR I=0 TO T-1
55:A$="":CLS
60:A$="A("+STR$ (
  I+1)+", "+STR$
  (J+1)+")"
70:PRINT A$:
80:INPUT A(I, J)
90:Z=Z+A(I, J)
100:NEXT I:BEEP 2
110:NEXT J:BEEP 4
120:END
130:"B":LPRINT "S
  UM and PERCENT
  *"
135:M=100
140:FOR J=0 TO Y-1
145:S=0
150:FOR I=0 TO T-1
160:S=S+A(I, J)
170:NEXT I
180:R=INT (S/Z*100
  00+0.5)/100
190:LF 1:USING :
  LPRINT "VERT.
  =" : J : LPRINT
  "S=" : S
195:M=M-R
200:USING :LPRINT
  "R=" : USING "##
  ##.##" : R : "%"

```

```

210:NEXT J
215:LF 1:M=100
230:FOR I=0 TO T-1
235:S=0
240:FOR J=0 TO Y-1
250:S=S+A(I, J)
260:NEXT J
270:R=INT (S/Z*100
  00+0.5)/100
280:LF 1:USING :
  LPRINT "HORIZ
  =" : I+1 : LPRINT
  "S=" : S
285:IF I=T-1 GOTO 3
  00
286:M=M-R
290:USING :LPRINT
  "R=" : USING "##
  ##.##" : R : "%"
300:NEXT I
305:USING :LPRINT
  "R=" : USING "##
  ##.##" : M : "%"
310:LF 1:USING :
  LPRINT "GRAND
  TOTAL*", USING
  "#####":Z
320:LF 4:END

```

STATUS (1)

055

REARRANGED  
By S. SHINO  
APR. 1984 SEAFDEC

RESULT OF PRINTOUT

\*SUM and PERCENT\*

\*VERT. = 1  
S= 1287.7  
R= 20.51%

\*VERT. = 2  
S= 154.3  
R= 2.46%

\*VERT. = 3  
S= 1095.8  
R= 17.46%

\*VERT. = 4  
S= 2373  
R= 37.81%

\*VERT. = 5  
S= 1366.1  
R= 21.76%

\*HORIZ. = 1  
S= 1365.2  
R= 21.75%

\*HORIZ. = 2  
S= 1698.2  
R= 27.05%

\*HORIZ. = 3  
S= 1960.2  
R= 31.23%

\*HORIZ. = 4  
S= 1253.3  
R= 19.97%

\*GRAND TOTAL\*

6276

21. Percentage bar graph - PROG.-99

```

5:REM PROG.-99
6:REM DEF -F-
7:REM *****
  * PERCENTAGE *
  * BAR GRAPH *
8:REM -----*
  * TABULATION *
  *****
10:"F":CLEAR :
  CSIZE 2:TEXT
20:BEEP 3:INPUT "
  TITLE(16d)="";A
  $:LPRINT A$:LF
  1
30:BEEP 3:INPUT "
  No.of BAR(2-8)
  =" ";B
35:DIM A$(B-1)
40:WAIT 0:FOR I=0
  TO B-1
42:CLS :A$="NAME
  OF BAR (" +STR$
  (I+1)+")="
44:PRINT A$;
46:BEEP 1:INPUT A
  $(I)
50:NEXT I
52:DIM X(B-1),C$(
  B-1)
54:FOR J=0TO B-1
56:C$(J)=LEFT$(A
  $(J),8)
58:NEXT J
60:WAIT 0:FOR I=0
  TO B-1
62:CLS :B$="DATA(
  "+C$(I)+")="
64:PRINT B$;
66:BEEP 2:INPUT X
  (I)
68:NEXT I
70:FOR I=0TO B-1:
  S1=S1+X(I)
80:NEXT I
90:FOR J=0TO B-1
92:IF M1<X(I)LET
  M1=X(I)
94:NEXT I:CLS
98:DIM XP(B-1)
100:FOR I=0TO B-1
102:XP(I)=X(I)/S1*
  100
104:IF M2<XP(I)LET
  M2=XP(I)
106:NEXT I
110:FOR I=0TO B-1
112:S2=S2+XP(I)
114:NEXT I
120:LPRINT "SUM of
  DATA=";S1
122:LPRINT "MAX of
  DATA=";M1
124:LPRINT "SUM of
  DATA(%)=";S2
126:LPRINT "MAX of
  DATA(%)=";M2:
  LF 1
130:GRAPH :
  GLCURSOR (0,-2
  50):SORGN
140:LINE (30,250)-
  (30,0)-(214,0)
145:AY=20
150:FOR J=48TO 240
  STEP 48
155:IF J=240GOTO 1
  90
160:GLCURSOR (-10,
  J-5):LPRINT AY
170:AY=AY+20
175:LINE (30,J)-(2
  14,J),1
180:NEXT J
190:GLCURSOR (0,24
  0):LPRINT " %"
  :GOTO 200
200:GLCURSOR (30,0
  )
210:X=180/B:Z=35
220:FOR I=0TO B-1
230:LINE (Z,0)-(Z+
  X-5,XP(I))*240/
  M2),,,B
235:Z=Z+X
240:NEXT I
245:X=180/B:Z=35
250:FOR I=0TO B-1
260:GLCURSOR (Z+5,
  -15):ROTATE 1:
  LPRINT A$(I)
265:Z=Z+X
270:NEXT I
280:TEXT :LF 5:
  LPRINT "--RECO
  RD OF DATA--":
  LF 2
290:FOR I=0TO B-1
300:LPRINT A$(I):
  NEXT I
305:LPRINT "*TOTAL
  *":LF 2
308:USING "##,###,
  ###,###"
310:FOR I=0TO B-1
315:LPRINT TAB 2;X
  (I)
320:NEXT I
325:USING "##,###,
  ###,###"
330:LPRINT TAB 2;S
  1:USING :LF 2
334:USING "####.##
  "
336:FOR I=0TO B-1
340:LPRINT XP(I);"
  %"
350:NEXT I
355:USING "####.##
  "
360:LPRINT S2;"%":
  LF 2
370:LPRINT "
  --END---":LF 4
380:END
STATUS(1)=1374
*****

By S.SHINDO
MAY 1984 SEAFDEC
*****

```

~~~~~  
RESULT OF PRINTOUT

PROG.-99

~~~~~

TITLE (DUMMY)

SUM of DATA= 29085  
610  
MAX of DATA= 78945  
63  
SUM of DATA(%)= 10  
0  
MAX of DATA(%)= 27  
.14250449

7,894,563  
6,547,896  
5,678,095  
2,345,055  
6,620,001  
29,085,610

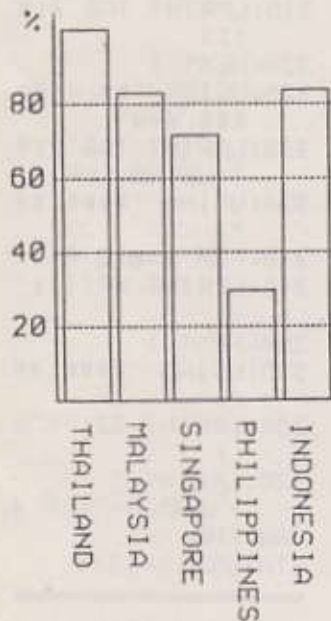
27.14%  
22.51%  
19.52%  
8.06%  
22.76%  
100.00%

--RECORD OF DATA--

TRAWL  
RING NET  
GILL NET  
LONGLINE  
PUSH NET  
DRIFT NET  
STOW NET  
\*TOTAL\*

7,891  
6,504  
4,521  
3,214  
3,110  
2,410  
1,020  
28,670

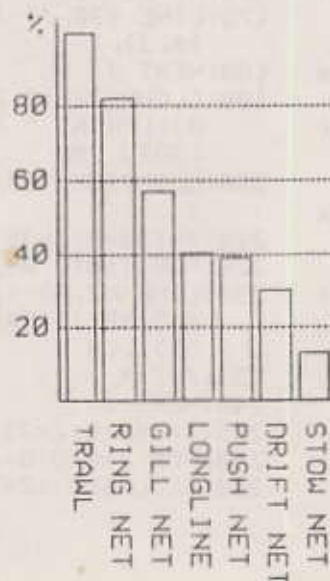
---END---



DUMMY DATA

SUM of DATA= 28670  
MAX of DATA= 7891  
SUM of DATA(%)= 10  
0  
MAX of DATA(%)= 27  
.52354377

27.52%  
22.68%  
15.76%  
11.21%  
10.84%  
8.40%  
3.55%  
100.00%



---END---

--RECORD OF DATA--

THAILAND  
MALAYSIA  
SINGAPORE  
PHILIPPINES  
INDONESIA  
\*TOTAL\*

22. Semi-log bar graph - PROG.-S54

```

5:REM PROG.-S54
6:REM DEF -G-
7:REM *****
  * SEMI-LOG *
  * BAR GRAPH *
  *****
10:"G":CLEAR :
  TEXT
20:BEEP 3:INPUT "
  No. of DATA(2-8
  )=?";N
30:BEEP 3:WAIT 15
  0:PRINT " * D1
  GITS of DATA=1
  -999 *":WAIT 0
40:DIM X(N),Y(N),
  YL(N)
50:FOR J=0TO N-1
60:CLS :A$="DATA
  (" +STR$(J+1)+
  ")="
70:PRINT A$;
80:INPUT Y(J)
90:NEXT J
100:FOR J=0TO N-1
110:YL(J)=LOG Y(J)
115:X(J)=(J+1)
120:NEXT J
130:CSIZE 1:LPRINT
  " -----REC
  ORD OF DATA---
  --":LF 1
140:LPRINT "
  DATA
  LOG DATA ":LF
  1
150:FOR J=0TO N-1
160:LPRINT TAB J;J
  +1:LF -1;
  LPRINT TAB 9;Y
  (J):LF -1;
  LPRINT TAB 18;
  YL(J)
170:NEXT J
180:CSIZE 2:LF 3:
  CLS
185:REM *****
190:GRAPH :
  GLCURSOR (0,-3
  00):SORGN
200:LINE (0,305)-(
  0,0)-(214,0)
210:GLCURSOR (0,31
  0):LPRINT "LOG
  Y"
220:LO=1:FOR J=1TO
  3:FOR J=1TO 9
230:LINE (0,LOG (J
  *LO)*100)-(214
  ,LOG (J*LO)*10
  0)
240:NEXT J:LO=LO*1
  0:NEXT J
250:GLCURSOR (0,0)
260:REM *****
300:X=200/N:Z=5
310:FOR J=0TO N-1
320:LINE (Z,0)-(Z+
  X-5,YL(J)*100)
  ,,,B
325:LINE (Z+2,0)-(
  Z+2+X-9,YL(J)*
  100-2),,,B
330:Z=Z+X
340:NEXT J
350:X=200/N:Z=5
355:FOR J=0TO N-1
360:GLCURSOR (Z,-2
  0):LPRINT J+1
370:Z=Z+X
380:NEXT J
390:GLCURSOR (0,0)
  :TEXT :LF 3
400:LPRINT "
  --END---":LF 4
410:END

STATUS (1)
921

*****
By S. SHINDO
MAY 1984 SEAFDEC
*****

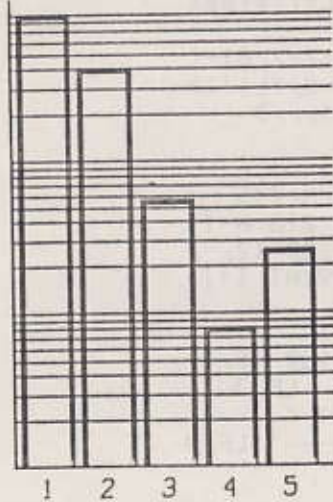
```

RESULT OF PRINTOUT  
 PROG.-S54

-----RECORD OF DATA-----

|   | DATA | LOG DATA    |
|---|------|-------------|
| 1 | 800  | 2.904242580 |
| 2 | 400  | 2.603385845 |
| 3 | 200  | 1.748362689 |
| 4 | 0    | 8.583885987 |
| 5 | 20   | 1.414973348 |

LOG Y

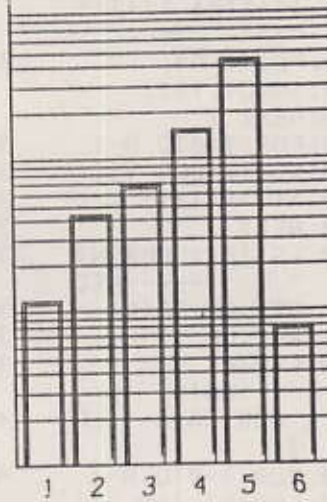


---END---

-----RECORD OF DATA-----

|   | DATA | LOG DATA    |
|---|------|-------------|
| 1 | 12   | 1.079181266 |
| 2 | 44   | 1.642432870 |
| 3 | 60   | 1.779648881 |
| 4 | 156  | 2.195124358 |
| 5 | 450  | 2.650364843 |
| 6 | 0    | 8.583885987 |

LOG Y



---END---

23. Time between A and B (hours, minutes and seconds) - PROG.-95

```

5:REM PROG.-95      190:IF Z=1: CLEAR : *****
6:REM DEF -D-      GOTO 20      RESULT OF PRINTOUT
7:REM *****      200:LF 4:END *****
  *TIME BETWEEN*
  *  A AND B  *
  * Hr.Min.Sec.*
  *****
10:"D":CLEAR
20:BEEP 3: INPUT "
  INITIAL HOUR=?
  ";HI
30:BEEP 3: INPUT "
  INITIAL MIN.=?
  ";MI
40:BEEP 3: INPUT "
  INITIAL SEC.=?
  ";SI
50:BEEP 3: INPUT "
  LAST HOUR=?";H
  L
60:BEEP 3: INPUT "
  LAST MIN.=?";
  ML
70:BEEP 3: INPUT "
  LAST SEC.=?";S
  L
80:TI=3600*HI+60*
  MI+SI
90:TL=3600*HL+60*
  ML+SL
100:T=TL-TI
110:H=INT (T/3600)
120:A=T-3600*H
130:M=INT (A/60)
140:S=A-60*M
145:LPRINT "TIME D
  IFFERENCE=":LF
  1
150:LPRINT "Hr. ="
  :H
160:LPRINT "Min. ="
  :M
170:LPRINT "Sec. ="
  :S
180:BEEP 3: INPUT "
  REPEAT: YES=1
  ,NO=2 ?";Z: IF
  Z>=3GOTO 180

```

STATUS (1)

535

By S.SHINDO  
FEB.1984 SEAFDEC

TIME DIFFERENCE=

Hr. = 8  
Min.= 13  
Sec.= 2

TIME DIFFERENCE=

Hr. = 2  
Min.= 24  
Sec.= 24

24. Time between A and B (years, months and days) - PROG.-11(E)

```

3:REM PROG.-11(E)
4:REM DEF -2-
5:REM *****
  *CALCULATION *
  *ON NUMBER OF*
  *DAYS, A & B *
  *****
6:"Z":CLEAR:
  LPRINT "1. DEF
  -A-":LPRINT "
  NUMBER OF D
  AYS      (=X) BE
  TWEEN    DAY
  -A"
7:LF -1:LPRINT "
  AND D
  AY-B":LF 1:
  LPRINT "2. DEF
  -B-":LPRINT "
  ESTIMATION
  OF"
8:LPRINT " DAY
  -B BY DAY-A
  PLUS X":LF 4:
  END
9:"A":CLEAR:LF
  -5:BEEP 5:WAIT
  80:PRINT " Se
  e EXPLANATION
  on PAPER":
  WAIT:LF 3
10:LPRINT "--CHOI
  CE OF ERA--":
  LF 1:LPRINT "W
  ESTERN A.D. sho
  uldbe between
  1950 and 200
  0"
11:LPRINT "JAPANE
  SE-SW-shouldbe
  between 25 an
  d 75"
12:LPRINT "See sc
  reen, TYPE":
  LPRINT "your c
  hoice 1 or 2":
  LF 4
15:BEEP 5:INPUT "
  WESTERN=1, JAPA
  NESE=2 ?":Y
20:IF (Y=1)+(Y=2)
  (>)GOTO 15
28:LF -3:LPRINT "
  ----CAUTION--
  -:LF 1
29:LPRINT "You ca
  n change DAY-B
  after 2nd cal
  culation,":LF
  -1
30:LPRINT "
  in that ca
  se, press ENTE
  R."
40:LPRINT "When f
  inished, pr
  ess ENTER twic
  e.":LF 1
45:LPRINT " ----
  -----":LF
  4
50:INPUT "INITIAL
  YEAR=?":R
60:INPUT "MONTH(J
  AN=1, FEB=2, etc
  .)=?":S
70:INPUT "DAY-A(J
  -31)=?":T
80:BEEP 3:INPUT "
  TERMINAL YEAR=
  ":U:GOTO 100
90:END
100:INPUT "MONTH(J
  -12)=?":V
110:INPUT "DAY-B(J
  -31)=?":W
120:H=R:G=S:I=T
130:IF Y=2LET H=H+
  1925
140:GOSUB 300:J=J
  1
150:H=U:G=V:I=W
160:IF Y=2LET H=H+
  1925
170:GOSUB 300:X=X-1
  J
175:LPRINT "DAY-A=
  ("STR$ I+ "/" +
  STR$ S+ "/" +
  STR$ R+ ")"
176:LPRINT "DAY-B=
  ("STR$ W+ "/" +
  STR$ U+ "/" +
  STR$ V+ ")"
180:LPRINT "No. of
  DAYS=":X:LF 2
185:PRINT "NUMBER
  OF DAYS=":X
190:GOTO 80
300:IF G-3>=0LET Z
  =-(G-3)*30.6-
  5:GOSUB 400:I=
  1-Z:GOTO 330
310:H=H-I
320:Z=-(G-3)-12)*
  30.5-.5:GOSUB
  400:I=I-Z
330:Z=H*365.25:
  GOSUB 400:I=I+
  Z
340:Z=H/100:GOSUB
  400:I=I-Z
350:Z=H/400:GOSUB
  400:I=I+Z
360:I=I-307
370:RETURN
400:X=INT ABS Z:Z=
  SGN Z*X
410:RETURN
500:"B":CLEAR:
  BEEP 5:WAIT 15
  8:PRINT " *
  ** CHOICE OF E
  RA ***":WAIT:
  BEEP 3
502:INPUT "WESTERN
  A.D.=1: JAPAN.
  =2?":X
503:IF (X=1)+(X=2)
  (>)GOTO 502
508:INPUT "INITIAL
  YEAR=?":L
510:INPUT "MONTH(J
  AN=1, FEB=2, etc
  .)=?":M
520:INPUT "DAY(I-3
  1)=?":N
525:LPRINT "***INIT
  IAL DAY-A**"

```

```

526:LPRINT "DAY-A=
      ("+STR$ N+"/"+"
      STR$ M+"/"+"
      STR$ L+")";LF
      J
530:BEEP 5: INPUT "
      No. of DAYS fro
      m DAY-A=?";H:
      GOTO 540
535:END
540:A=L:B=M:C=N: IF
      X=2LET A=A+192
      5
550:GOSUB 750:F=G
560:D=H+F
570:A=1950:B=J:C=0
580:A=A+J:GOSUB 75
      0
590:IF D>GTHEN 500
600:A=A-1
610:B=B+J:GOSUB 75
      0
620:IF D>GTHEN 610
630:B=B-1:GOSUB 75
      0
640:C=D-G
650:IF X=2LET A=A-
      1925
656:LPRINT "No. of
      DAYS=";H
660:LPRINT "DAY-B=
      ("+STR$ C+"/"+"
      STR$ B+"/"+"
      STR$ A+")";LF
      J
665:PRINT "DAY-B=(
      "+STR$ C+"/"+"
      STR$ B+"/"+"
      STR$ A+")"
670:GOTO 530
750:IF 3>BLET J=A-
      1:J=B+13:GOTO
      770
760:J=B+1:J=A
770:Z=365.25*J:
      GOSUB 810:Y=Z
780:Z=30.6*J:GOSUB
      810
790:G=Y+Z+C-621049
800:RETURN

```

```

810:W=INT (SGN Z*Z
      ):Z=SGN Z*W
820:RETURN
830:END

```

STATUS (1)

2149

By S. SHINDO (REV.)

MAR. 1984 SEAFDEC

RESULT OF PRINTOUT

1. DEF -A-  
NUMBER OF DAYS  
(=X) BETWEEN  
DAY-A AND DAY-B

2. DEF -B-  
ESTIMATION OF  
DAY-B BY DAY-A  
PLUS X

--CHOICE OF ERA--

WESTERN A.D. should  
be between 1950  
and 2000

JAPANESE-SW-should  
be between 25 and  
75

See screen, TYPE  
your choice 1 or 2

---CAUTION---

You can change DAY  
-B after 2nd calcu  
lation, in that  
case, press ENTER.  
When finished,  
press ENTER twice.

DAY-A=(25/3/1984)  
DAY-B=(23/6/1985)  
No. of DAYS= 455

DAY-A=(25/3/1984)  
DAY-B=(31/12/1999)  
No. of DAYS= 5759

DAY-A=(25/3/1984)  
DAY-B=(24/10/1980)  
No. of DAYS=-1248

\*\*INITIAL DAY-A\*\*  
DAY-A=(25/3/1984)

No. of DAYS= 120  
DAY-B=(23/7/1984)

No. of DAYS= 555  
DAY-B=(1/10/1985)

No. of DAYS= 1  
DAY-B=(26/3/1984)

25. Calendar - PROG.-7(E)

```

5:REM PROG.-7(E)
6:REM DEF -A-
7:REM *****
  * CALENDER *
  *****
9:"A":CLEAR:
  BEEP 10:WAIT 2
  00:PRINT " ** W
  hen END press
  ENTER **":WAIT
10:DIM A$(9),B$(1
  3)
20:A$(0)="0":A$(1
  )="1":A$(2)="2
  ":A$(3)="3":A$
  (4)="4"
30:A$(5)="5":A$(6
  )="6":A$(7)="7
  ":A$(8)="8":A$
  (9)="9"
40:BEEP 5:INPUT "
  Key in YEAR(4
  Digits)="":A:
  GOTO 60
50:ROTATE 0:TEXT
  :END
60:BEEP 3:INPUT "
  MONTH(JAN=1,FE
  B=2,e1c.)=?":B
65:IF B<1GOTO 60
67:IF B>12GOTO 60
70:IF (B=4)+(B=6)
  +(B=9)+(B=11)=
  1LET P=30:GOTO
  160
80:IF B<>2LET P=3
  1:GOTO 160
90:X=0
100:IF A-JNT (A/4)
  *4=0LET X=1
110:IF A-JNT (A/10
  0)*100<>0GOTO
  150
120:X=X-1
130:IF A-JNT (A/40
  0)*400=0LET X=
  X+1
150:P=28+X
160:W=A:U=B:IF B-3
  <0LET A=A-1:B=
  B+13:GOTO 180
170:B=B+1
180:C=JNT (365.25*
  A)+JNT (30.6*B
  )-122+J
183:C=C-JNT (A/100
  )+JNT (A/400):

```

```

C=C-306
190:Q=C-JNT (C/7)*
  7
200:GRAPH:ROTATE
  1
210:GLCURSOR (200,
  -45)
220:LPRINT W;" ";U
230:B$(0)="S":B$(1
  )="u":B$(2)="M
  ":B$(3)="o":B$
  (4)="T":B$(5)=
  "u":B$(6)="W"
240:B$(7)="e":B$(8
  )="T":B$(9)="h
  ":B$(10)="F":B
  $(11)="r":B$(1
  2)="5":B$(13)=
  "a"
250:GLCURSOR (170,
  0):GOSUB 600
330:FOR J=0TO 5
340:S=(5-1)*29:
  GLCURSOR (S,0)
350:FOR J=1TO 7
360:IF (7*J+J-0<1)
  +(7*J+J-0>P)=1
  LET B$(2*J-2)=
  " ":B$(2*J-1)=
  "*":GOTO 400
370:R=7*J+J-0:T=R-
  JNT (R/10)*10:
  U=JNT (R/10):B
  $(2*J-2)=A$(U)
380:IF U=0LET B$(2
  *J-2)=" "
390:B$(2*J-1)=A$(T
  )
400:NEXT J
403:GOSUB 600
460:NEXT J
480:LINE (0,-244)-
  (216,11),,,B
482:LINE (189,11)-
  (189,-244)
484:LINE (0,-26)-
  (189,-26),1
486:LINE (162,11)-
  (162,-244)
490:GLCURSOR (0,-2
  75)
500:GOTO 40
600:FOR K=0TO 12
  STEP 2
610:IF K=0THEN 640
620:IF K=2THEN 640
640:B$=B$(K)+B$(K+

```

```

1)+ " "
650:LPRINT B$
660:NEXT K
670:RETURN
680:END

```

STATUS (1)

1345

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

REARRANGED  
By S. SHINDO  
DEC. 1983 SEAFDEC

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

RESULT OF PRINTOUT

| 1984. 4 |    |    |    |    |    |    |
|---------|----|----|----|----|----|----|
| Su      | Mo | Tu | We | Th | Fr | Sa |
| 1       | 2  | 3  | 4  | 5  | 6  | 7  |
| 8       | 9  | 10 | 11 | 12 | 13 | 14 |
| 15      | 16 | 17 | 18 | 19 | 20 | 21 |
| 22      | 23 | 24 | 25 | 26 | 27 | 28 |
| 29      | 30 |    |    |    |    |    |

| 1989. 11 |    |    |    |    |    |    |
|----------|----|----|----|----|----|----|
| Su       | Mo | Tu | We | Th | Fr | Sa |
|          |    |    |    |    |    |    |
| 5        | 6  | 7  | 8  | 9  | 10 | 11 |
| 12       | 13 | 14 | 15 | 16 | 17 | 18 |
| 19       | 20 | 21 | 22 | 23 | 24 | 25 |
| 26       | 27 | 28 | 29 | 30 |    |    |