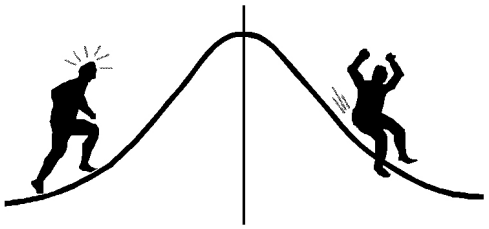

BIOMETRICS INFORMATION

(You're 95% likely to need this information)

PAMPHLET NO. # 15 DATE: March 1, 1989

SUBJECT: Using SAS to obtain probability values for F-, t- and χ^2-statistics

Most statistics packages now output the probability values for the observed F-, t- and χ^2-values. Statisticians like to see these values reported, instead of the old-fashioned α-levels (.10, .05, .01 etc.) as they provide more information. For instance, a reader can choose a different α-level than the author did. Occasionally these observed values must be calculated by hand. The associated probability values can be obtained by simple SAS programs.

An example program for F-values is:

```
TITLE 'EXAMPLE PROGRAM FOR CALCULATION OF PROBABILITIES OF OBSERVED F-VALUES';
  DATA FVALUES;
    INPUT F NDF DDF;
    PROB = 1 - PROBF(F,NDF,DDF);
  CARDS;
  0.28 1 304
  4.42 1 304
  2.75 1 304
  3.92 1 120
  6.85 1 120
  2.96 6 120
  RUN;
  PROC PRINT SPLIT = '_';
    LABEL   F    = 'F-VALUE'
          NDF    = 'NUMERATOR_DF'
          DDF    = 'DENOMINATOR_DF'
          PROB   = 'PROB > F';
  RUN;
```

This program has the following output:

EXAMPLE PROGRAM FOR CALCULATION OF PROBABILITIES OF OBSERVED F-VALUES

OBS	F-VALUE	NUMERATOR DF	DENOMINATOR DF	PROB > F
1	0.28	1	304	0.59709
2	4.42	1	304	0.03634
3	2.75	1	304	0.09829
4	3.92	1	120	0.05000
5	6.85	1	120	0.01000
6	2.96	6	120	0.00991

An example program for χ^2-values is:

```
TITLE 'EXAMPLE PROGRAM FOR CALCULATION OF PROBABILITIES OF OBSERVED CHI-SQUARED VALUES';
    DATA CHISQ;
      INPUT CHISQ DF;
      PROB = 1 - PROBCHI(CHISQ,DF);
    CARDS;
    16.92  9
    37.57 20
     9.39 18
    40.26 30
    RUN;
    PROC PRINT SPLIT='_';
      LABEL   CHISQ  = 'CHI-SQUARE_VALUE'
               DF    = 'DEGREES OF_FREEDOM'
              PROB   = 'PROB > CHISQ';
    RUN;
```

With the following output:

```
EXAMPLE PROGRAM FOR CALCULATION OF PROBABILITIES OF OBSERVED CHI-SQUARED VALUES

                        CHI-SQUARE    DEGREES OF
                OBS       VALUE        FREEDOM      PROB > CHISQ

                 1         16.92           9          0.04998
                 2         37.57          20          0.00999
                 3          9.39          18          0.95001
                 4         40.26          30          0.09993
```

The above program can easily be adapted for the t-statistic by changing the `PROBCHI` function to `PROBT`. The functions `PROBF`, `PROBCHI` and `PROBT` are described in the BASICS guides for Version 5.0 and the Language Guides for Version 6.03.

OBVIOUS INDICATORS OF NON-SIGNIFICANCE:

F-statistic: values less than 1

t-statistic: values with an absolute value less than 1

χ^2-statistic: values less than the degrees of freedom.

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