

Functions in SAS

Prepared by



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Functions

A SAS function is a routine that returns a value resulting from zero or more arguments. A function is invoked by writing its name and then any arguments required in parentheses. There are dozens of functions in the SAS System. We look at several functions here. More will be seen later in the course.

The Round Function

This function is useful for rounding values to the nearest round-off unit. For example, suppose we have data that is stored to 4 decimal places. The following data step illustrates the use of the Round function:

PROGRAM EDITOR

```
data roundoff;
  input sample test1;
  a = round (test1 , 0.1) ;
  b = round (test1 , 10) ;
  c = round (test1 , 1) - 1 ;
  d = round (test1 , 10) - 0.1 ;
  cards;
1 300.6296
2 63.7681
3 45.290
4 34.0091
5 194.9158
run;
proc print;
run;
```

OUTPUT

OBS	SAMPLE	TEST1	A	B	C	D
1	1	300.630	300.6	300	300	299.9
2	2	63.768	63.8	60	63	59.9
3	3	45.290	45.3	50	44	49.9
4	4	34.009	34.0	30	33	29.9
5	5	194.916	194.9	190	194	189.9

Statistical Functions

The Min, Max and Std (standard deviation) functions are useful for calculating statistics for each observation, rather than for each variable. For example, Proc Means can give the average of a variable over all the observations. In other words, Proc Means gives the average cost, or the average length, or the average weight for all the observations.

However, statistical functions can provide statistics over all the variables for each observation:

```

      Var1   Var2   Var3   Var4
.....
Obs 1 | Functions work across
2 .
3 .
4 .
5 .
6 .
7 .
8 .
. .
. .
. .
. . Procedures Work Down
.....
```

Let's apply the mean, min and max functions to the following data:

Date	Temp1	Temp2	Temp3	Temp4
01Jan90	34.6	34.6	34.5	34.2
02Jan90	33.9	34.2	34.1	34.0
03Jan90	33.8	33.9	34.0	34.5
04Jan90	33.9	34.5	34.7	34.8
05Jan90	34.5	34.4	34.4	34.5

Example

PROGRAM EDITOR

```
data tempstat;
  input date $ temp1 temp2 temp3 temp4;
  avgtemp=mean(temp1,temp2,temp3,temp4);
  mintemp=min(of temp1-temp4);
  maxtemp=max(temp1,temp2,temp3,temp4);
  cards;
01Jan90 34.6 34.6 34.5 34.2
02Jan90 33.9 34.2 34.1 34.0
03Jan90 33.8 33.9 34.0 34.5
04Jan90 33.9 34.5 34.7 34.8
05Jan90 34.5 34.4 34.4 34.5
run;
proc print;
run;
```

OUTPUT

OBS	DATE	TEMP1	TEMP2	TEMP3	TEMP4	AVGTEMP	MINTEMP	MAXTEMP
1	01Jan90	34.6	34.6	34.5	34.2	34.475	34.2	34.6
2	02Jan90	33.9	34.2	34.1	34.0	34.050	33.9	34.2
3	03Jan90	33.8	33.9	34.0	34.5	34.050	33.8	34.5
4	04Jan90	33.9	34.5	34.7	34.8	34.475	33.9	34.8

Sum Function

The Sum function can be used to find the total of values across an observation. For example, we wish to find the total of all males and females in a data set. Assume we have the numbers of male and female respondents to a telephone survey:

QUESTION	MALE	FEMALE
1	30	76
2	15	63
3	74	28
4	36	93
5	83	60

How would we find the total respondents for the Questions? The Sum function can help:

PROGRAM EDITOR

```
data total;
  set saved.survey;
  total=sum(male,female);
run;
```

Substr Function

A very useful function for extracting parts of character variables, the Substr function can be used in two different ways:

PROGRAM EDITOR

```
data names;
  name='william shakespeare';
  first=substr(name,1,7);
  last=substr(name,9,11);
  initial=substr(name,1,1);
run;
proc print;
run;
```

OUTPUT

OBS	NAME	FIRST	LAST	INITIAL
1	william shakespeare	william	shakespeare	w

Let's replace "William" with "Bill G." :

PROGRAM EDITOR

```
data names;
  name='william shakespeare';
  substr(name,1,7)='bill g.';
run;
proc print;
run;
```

OUTPUT

OBS	NAME
-----	------

The technique can be used to replace any string.

Scan Function

The Scan Function also extracts words from character strings, but is used when the starting position is not known.

Assume we have the following as a character value:

Bookname

```
.....
•The Hitch-Hiker's Guide To The Galaxy
.....
```

```
First =Scan(Bookname,1); ==> First ='The'
Second=Scan(Bookname,4); ==> Second='Guide'
```

The Scan function takes a variable as its first argument, and the number of the word you wish to extract as the second.

Delimiters - the third argument

The set of default delimiters is:

Blank . < (+ | & ! \$ *) ; ^ - / , % . ¢

Defining just the dash as delimiter:

```
First=Scan(Bookname,1,'-');
==> First='The Hitch'
Second=Scan(Bookname,2,'-');
==> Second='Hiker's Guide to the Galaxy'
```

Index Function

The Index function searches a character string for the location of a string specified.

Bookname

```
.....
•The Hitch-Hiker's Guide To The Galaxy
.....
```

Let's test to see if the string 'itch' is to be found in the above string:

```
Position=Index(Bookname,'itch');
==> Position=6
```

The Index function returns the position of the beginning the string. If the string is not found, Index returns 0.

Example

Select all books that have 'Hitch-Hiker' in the name:

```
If Index(Bookname,'Hitch-Hiker') > 0 ;
```

As long as we find the text somewhere in the title, we know the observation will be selected.

Uppcase Function

The Uppcase function converts text to upper case in a string, and is useful in comparative testing situations.

Bookname

```
.....  
•The Hitch-Hikers Guide To The Galaxy •  
.....
```

```
Upbook=Uppcase(Bookname);  
==>Upbook=  
'THE HITCH-HIKERS GUIDE TO THE GALAXY'
```

You could use this in situations where user input can be in upper or lower case, and you need to test on the value input.

List of Functions in the SAS System

These are the functions in Base SAS Software. There are more in the SAS System family of products.

Functions By Category

- Arithmetic Functions
- Bitwise Logical Functions
- Character Functions
- Date and Time Functions
- Financial Functions
- Mathematical Functions
- Noncentrality Functions
- Probability Functions
- Quantile Functions
- Random Number Functions
- Sample Statistic Functions
- Special Functions
- State and Zip Code Functions
- Trigonometric Functions
- Truncation Functions