

[6.14] Use *norm()* to find root mean square (RMS) statistic for matrices

The root mean square statistic is used in statistics. I prefer to use it over other statistics for comparing curve fits and interpolation errors. RMS is defined as

$$\text{RMS} = \sqrt{\frac{1}{n} \sum_{i=1}^n (x_i^2)}$$

The 89/92+ *norm()* function is very close to this:

$$\text{norm}([a, b, c, \dots]) = \sqrt{a^2 + b^2 + c^2 + \dots}$$

so we can rewrite the RMS equation and use the *norm()* function to find RMS:

$$\text{RMS} = \frac{1}{\sqrt{n}} [\text{norm}(d\text{matrix})]$$

where *dmatrix* is the matrix of data values, and *n* is the size of the matrix. This function performs the calculation:

```
rms(m)
func
if gettype(m)="LIST":list>mat(m)->m
norm(m)/(sqrt(max(dim(m))))
Endfunc
```

The input variable *m* may be a list or a matrix. If *m* is a matrix, it may be either a single-row or a single-column matrix. This is handled by using the maximum value returned by *dim()* as the value of *n*.