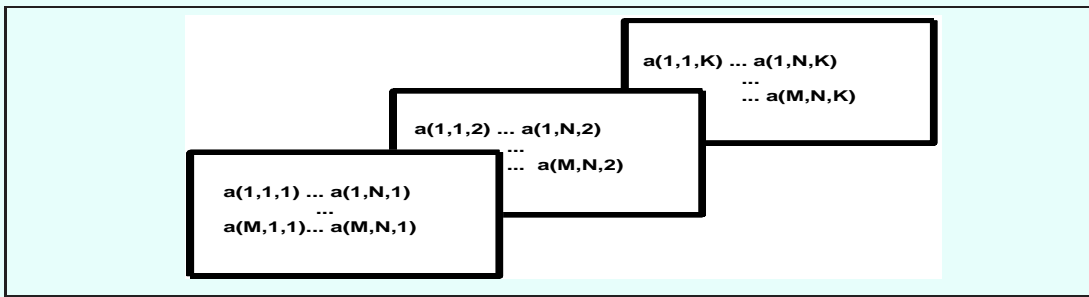


9. MULTIDIMENSIONAL ARRAYS

9.1 Multidimensional Arrays

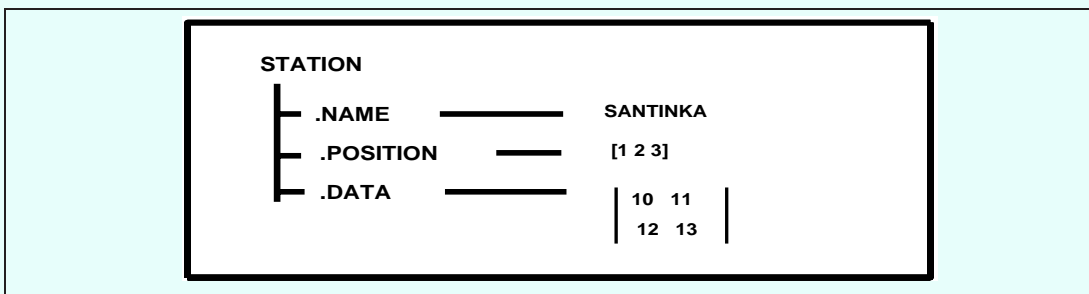


1. The number of levels is not limited
2. Commands for multidimensional data processing are the same as that for matrices

%%% Example 9.1: Multidimensional array definition

```
>> A(2,2,1)=1;  
>> A(2,2,2)=2;  
>> A % Variable display
```

9.2 Structured Arrays

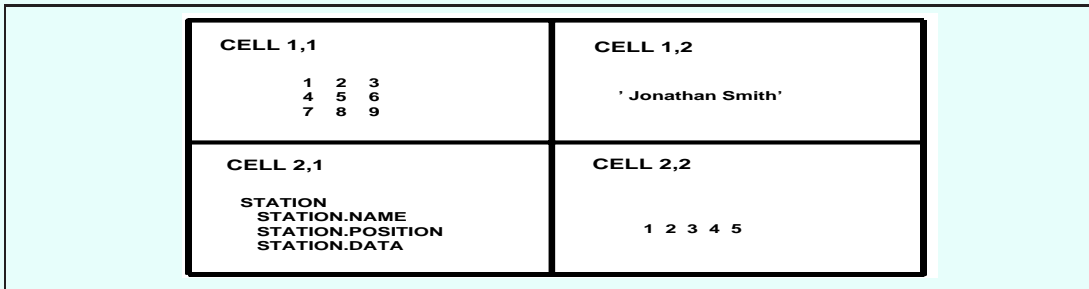


1. The system enables construction of simple databases
2. Data items can be of the different kind

%%% Example 9.2: Structured array definition

```
>> STATION(1).NAME='SANTINKA';  
>> STATION(1).POSITION=[1 2 3];  
>> STATION(1).DATA=[10 11;12 13];  
>> STATION % Variable display  
>> D=STATION(1).DATA % Data selection
```

9.3 Cells



1. Data items can be of any kind

%%% Example 9.3: The field of cells

```
>> C{1,1}=[1 2 3; 4 5 6; 8 9 10];  
>> C{1,2}='Jonathan Smith';  
>> C{2,1}=STATION;  
>> C{2,2}=[1 2 3 4 5]; C % Variable display  
>> P=C{2,1}.POSITION(2) % Data selection
```

COMMANDS

WHOS

EXAMPLES 9

9.1 Using table G2010.XLS import into the MATLAB environment temperatures measured at different parts of the glass furnace (in columns 4, 5 and 6) and store them in the structured array

10. SYMBOLIC MATHEMATICS

10.1 Symbolic Manipulation

%% Example 9.1: Definition and manipulation with symbolic variables

```
>> syms a b c x n t p;  
>> y1=3*x^2+5*x+3; y2=5*x^2+6; y3=y1+y2; pretty(y3)  
>> y4=sin(x)^2+cos(x)^2; y5=simplify(y4)  
>> ezplot(y3,[-2 1])
```

10.2 Symbolic Substitution

%% Example 10.2: Substitution and visualization

```
>> d=(a+b)^(1/2);  
>> f1=subs(d,a,0)  
>> f2=subs(d,{a,b},{1 4})
```

10.3 Symbolic Summation

%% Example 10.3: Evaluation of $\sum(1/n^2)$ for $n=1,2,\dots$

```
>> s1=symsum(1/n^2,1,inf)
```

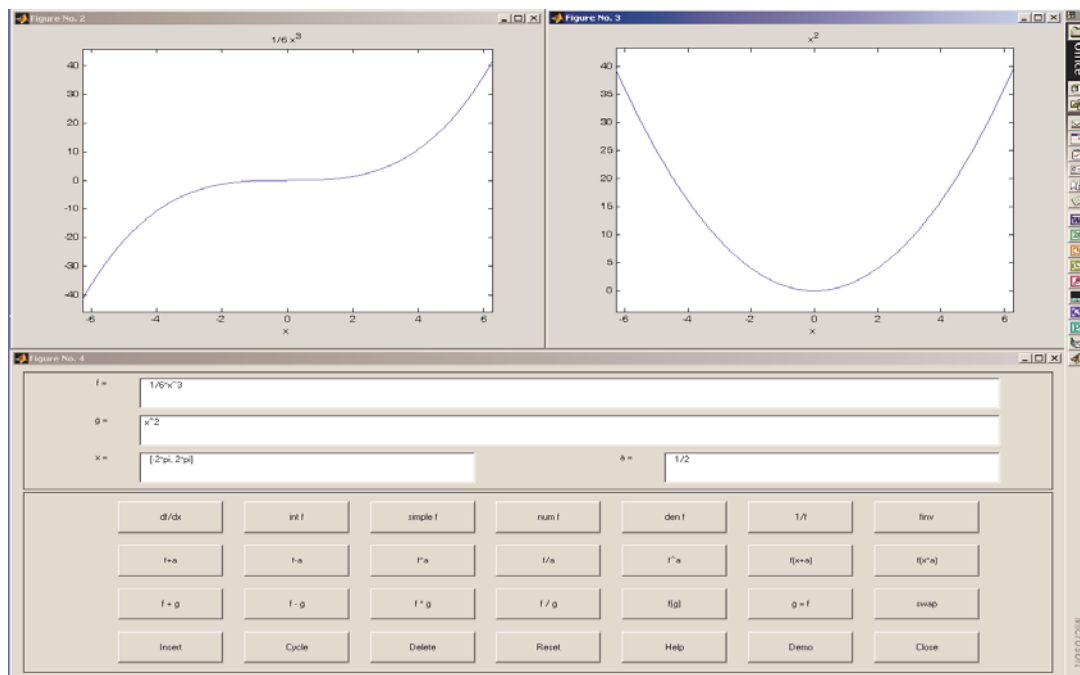
10.4 Symbolic Differentiation and Integration

%% Example 10.4: Substitution and visualization

```
>> f1=sin(a*x+b)^2; df=diff(f1)  
>> f2=1/x; intf2=int(f2)
```

COMMANDS

SYMS
PRETTY
SIMPLIFY
SUBS
SYMSUM
DIFF
EZPLOT



EXAMPLES 9

9.1 Plot selected symbolically defined functions

9.2 Evaluate chosen sums of given sequences