SciLab: Notes on Installation and Getting Familiar, Programming, and Useful Functions

Installation and Getting Familiar with SciLab

1. Installation of SciLab:

Download: Visit the official SciLab website
[here](https://www.scilab.org/download/latest) to download the latest version suitable for your operating system (Windows, Mac, Linux).
Install: Follow the installation instructions provided:
- Windows: Run the downloaded `.exe` file and follow the setup wizard.
- Mac: Open the downloaded `.dmg` file and drag the SciLab icon to the Applications folder.
- Linux: Extract the downloaded archive and follow the installation instructions in the README file.
Verify Installation: Open SciLab. If installed correctly, you will see the SciLab console window.

2. Getting Familiar with SciLab:

User Interface:
- Console Window: The main window where you can enter commands and see outputs.
- Editor: An integrated editor for writing and executing scripts.
- Command History: Displays the list of previously executed commands.
- Variable Browser: Shows the variables currently in memory.
Basic Commands:
- `disp("Hello, World!");` – Display text in the console.
- `a = 5;` – Assign value to a variable.
- `whos();` – List all variables in the workspace.

Programming with SciLab

1. Basics of SciLab Programming:

Variables:
- Assign variables using the `=` operator: `x = 10;`
- Variable names are case-sensitive.
Vectors and Matrices:
- Create vectors: `v = [1, 2, 3, 4];`
- Create matrices: `m = [1, 2; 3, 4];`
Basic Operations:
- Addition: `c = a + b;`
- Subtraction: `c = a - b;`
- Multiplication: `c = a * b;`
- Division: `c = a / b;`

Control Structures:
- If-Else:
```scilab
if x > 0 then
   disp("Positive");
else
   disp("Non-positive");
end
```
- For Loop:
```scilab
for i = 1:10
   disp(i);
end
```
- While Loop:
```scilab
i = 1;
while i <= 10 do
   disp(i);
   i = i + 1;
end
```

2. Functions in SciLab:

Defining Functions:
```scilab
function y = square(x)
   y = x^2;
endfunction
```
Calling Functions:
```scilab
result = square(4);
disp(result);  // Outputs 16
```

Useful SciLab Functions

1. Mathematical Functions:

- `sqrt(x)` – Square root of `x`.
- `exp(x)` – Exponential of `x`.

- `log(x)` – Natural logarithm of `x`.
- `sin(x)` – Sine of `x` (in radians).
- `cos(x)` – Cosine of `x` (in radians).
- `tan(x)` – Tangent of `x` (in radians).

2. Matrix Operations:
- `inv(A)` – Inverse of matrix `A`.
- `det(A)` – Determinant of matrix `A`.
- `size(A)` – Size of matrix `A`.
- `transpose(A)` – Transpose of matrix `A`.

3. Plotting Functions:
Basic Plot:
```scilab
x = 0:0.1:2*%pi;
y = sin(x);
plot(x, y);
```
Advanced Plot:
```scilab
clf;
x = 0:0.1:2*%pi;
y1 = sin(x);
y2 = cos(x);
plot(x, y1);
plot(x, y2);
legend("sin(x)", "cos(x)");
title("Sine and Cosine Functions");
xlabel("x");
ylabel("y");
```

4. File Operations:
Reading Files:
```scilab
data = csvRead("data.csv");
```
Writing Files:
```scilab
csvWrite(data, "output.csv");
```