

Date:

Aim

To learn programming for simple functions in SCILAB environment with the use of input, disp, if, elseif, for, while loops command.

Example problems

1. Use of built-in function disp

Try the following in the console window of SCILAB

- a. To a string (Usually a sentence), put in between quotes.

```
-->disp("Bob won")
```

```
Bob won
```

- b. To display combination of words and values use string command which converts values to character strings using “+” between different parts:

```
-->d=500;
```

```
-->disp("Bob won "+string(d)+" dollars")
```

```
Bob won 500 dollars
```

- c. Use of For command

Try this in the console window of SCILAB to get the values of $u(n)$ for 20 terms

```
-->u(1)=4;
```

```
--> for n=1:20
```

```
> u(n+1)= u(n)+2*n+3;
```

```
> disp([n u(n)])
```

```
> end
```

```
1.     4.
```

```
2.     9.
```

```
3.     16.
```

```
4.     25.
```

5. 36.
6. 49.
7. 64.
8. 81.
9. 100.
10. 121.
11. 144.
12. 169.
13. 196.
14. 225.
15. 256.
16. 289.
17. 324.
18. 361.
19. 400.
20. 441.

3. Use of For loop to get n! values:

```
function [fout]= factor(n)
    x=1;
    for i=1:n
        x= i*x
    end
    fout=x
endfunction
```

Goto console window and try the following
-->factor(5)

```
ans =  
    120.
```

4. Use of while loop

To stop a loop whenever a goal is reached, `while...end` structure is used.

Try the following in the command or console window

I planted a Christmas tree in 2005 measuring 1.20 m. It grows by 30 cm per year. I decided to cut it when it exceeds 7 m. In what year I cut the tree

Open the console window and try the following:

```
-->h= 1.2;  
-->y= 2005;  
--> while h<7  
    > h=h+0.3;  
    > y=y+1;  
    > end  
-->y  
y =  
    2025.
```

5. Another example of while loop

To get final values of x for given function using while loop

```
--> x=8;  
  
--> while x>0  
    > x=x-3;  
    > disp(x)  
    > if x<3  
    > break  
    > end;  
    > end
```

5.

2.

6. Write a program to display the results (Pass/Fail) of an exam using `input`, `if`, `elseif` and `disp` commands

Program for displaying of result as per average marks

Open SciNotes and type the following :

```
avgmark=input('enter the avg mark:');
if avgmark>=75
    disp('passed with distinction')
elseif avgmark>=60
    disp('passed with first class')
elseif avgmark>=45
    disp('passed with second class')
elseif avgmark>=0
    disp('failed')
end
```

Save and execute the above function in console window

```
enter the avg mark:85
```

```
passed with distinction
```

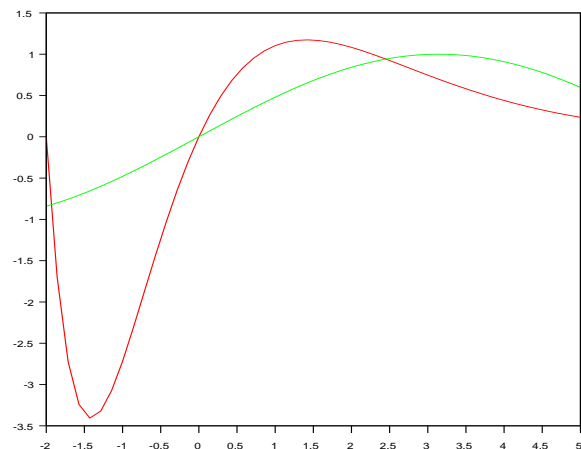
7. Plotting of plane curves by functions

For example consider two functions f and g defined over the interval $-2 \leq x \leq 5$ with 50 points (i.e. number of points between -2 and 5 in the interval. $(x) = (x^2+2x)e^{-x}$ and $g(x) = \sin(x/2)$

Open the SciNotes and try the following:

```
function y = f(x)
    y=(x^2+2*x)*exp(-x)
endfunction
x=linspace(-2,5,50);
plot(x,f)
```

```
function y = g(x)
    y=sin(x/2)
endfunction
x=linspace(-2,5,50);
clf
plot(x,f,"r",x,g,"g")
```



Plot of sequence of points using for command

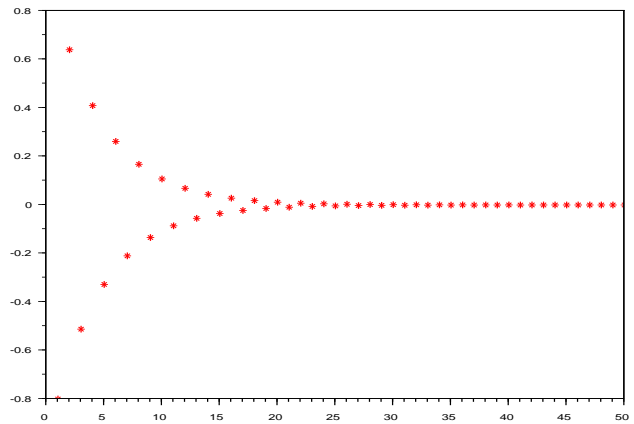
```
-->n=[0:5:50]';
```

```
-->for n=1:50
```

```

>u(n) = (-0.8)^n;
>end
-->clf;
-->plot(u, "*r")

```



8. Solving a differential equation $y'' = -4y$; $y(0) = 3$, $y'(0) = 0$.

Open SciNotes and try the following

```

function yprim=f(t, y)
    yprim(1)=y(2);
    yprim(2)=-4*y(1);
endfunction

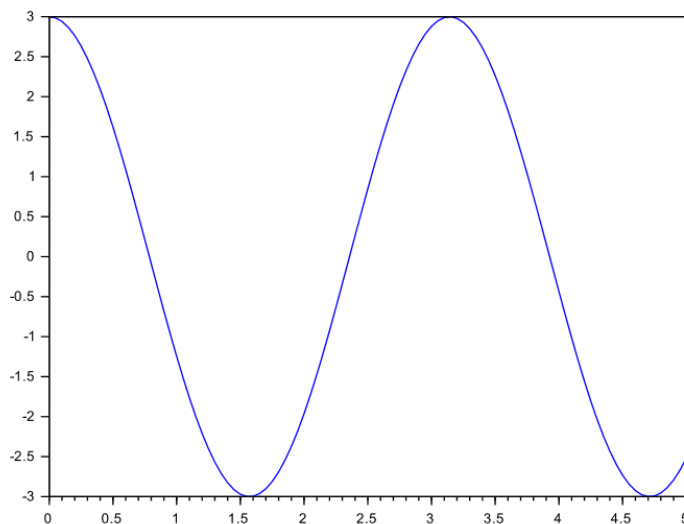
```

Goto the console window and try the following

```

-->t0=0;
-->tmax=5;
-->t=t0:0.05:tmax;
-->y0=3;
-->yprim0=0;
-->y=ode([y0;yprim0],t0,t,f);
-->clf;
-->plot(t,y(1,:))

```



9. Write a simple program to compute simple interest using built-in function input. Also write a code for the same using function definition. Assume principal, p as 10000 USD, interest rate, i as 8%, time period, $n = 5$ years. To calculate simple interest for $p = 10000$, $i=8\%$, $n=5$, try the following in the SciNotes window:

```
function [amount]=pmf (p, i, n)
    amount= p+(p*i*n)/100
endfunction
```

Go to console window and execute the function as given below:

```
->pmf (10000, 8, 5)
ans =

    14000.
```

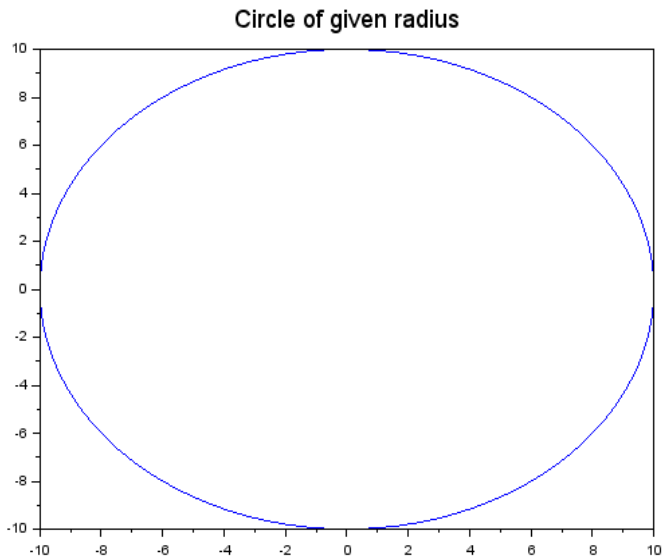
10. Create a circle using input built-in function in SCILAB editor window.
Hint: Take help from the previous circle plot problem.

Open the SciNotes and try the following:

```
r=input('Enter the radius of the circle = ')
theta=linspace(0,2*%pi,100);
x=r*cos(theta);
y=r*sin(theta);
circle=[x y];
plot(x,y);
xlabel('x');
ylabel('y');
title('Circle of given radius',"fontsize",4);
```

Save and execute the program in console window

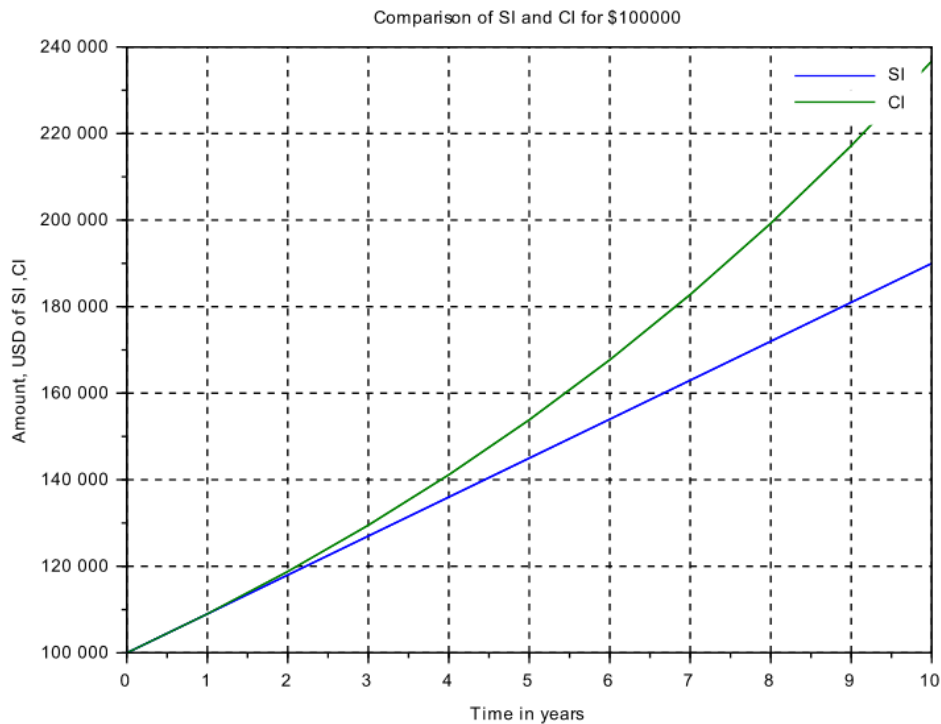
Enter the radius of the circle = 10



11. Determine the future value of a deposit both simple interest and compound interest using input built-in function in the SCILAB program. Plot a graph with properly labelled legends and axis (x - y) between the future values by simple and compound interest versus the time if the USD 100,000 is deposited in the bank with an interest rate of 9%. Hint: Do not use function definition in the program.

To determine the future value of a deposit both by simple and compound interest of \$100000, goto console window and try the following:

```
n=[0:1:10]';
p=100000;
i=9;
si = p+(p*i*n)./100;
ci = p.*((1+i/100)^n);
y = [si ci];
plot(n,y)
xlabel('Time in years');
ylabel('Amount, USD of SI ,CI');
legend('SI','CI',1,%F);
xtitle('Comparison of SI and CI for $100000');
xgrid(1);
```



12. For the above problem use function code in editor window and write a program in SCILAB that gives a plot for future value of the deposit through simple and compound interest.

Open SciNotes and create the function file as given below

```
function y=interest(n, p, i)
    si = p+(p*i*n) ./100;
    ci = p.*((1+i/100)^n);
    y = [si ci];
endfunction
```

Save and execute the above function from console window

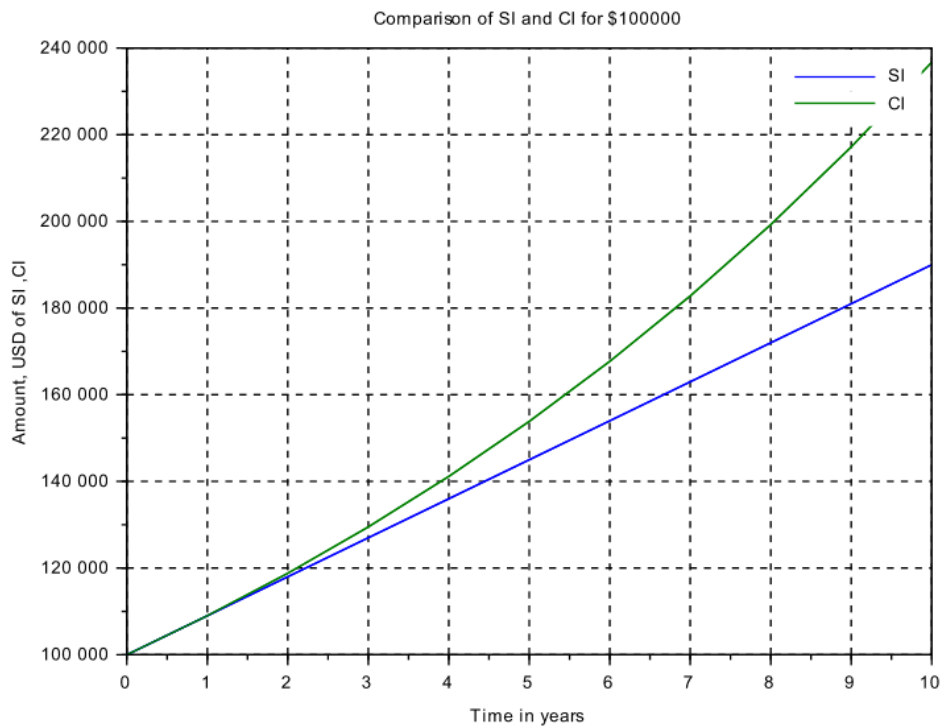
```
-->n=[0:1:10]';
-->p=100000;
-->i=9;
-->y = [si ci]
y =

    100000.    100000.
    109000.    109000.
    118000.    118810.
    127000.    129502.9
    136000.    141158.16
    145000.    153862.4
```



```
154000.    167710.01
163000.    182803.91
172000.    199256.26
181000.    217189.33
190000.    236736.37
```

```
-->plot(n,y)
-->xlabel('Time in years');
-->ylabel('Amount, USD of SI ,CI');
-->legend('SI','CI',1,%F);
-->xtitle('Comparison of SI and CI for $100000');
-->xgrid(1);
```



Result

Thus we learned SCILAB programming for simple functions in SCILAB environment with the use of input, disp, if, elseif, for, and while loops commands.