

## Newton's Method

Write the program in the editor page by clicking on **New Script** , **Save** it , then click **Run**.

**Example; Find an approximation root to the following equation with error  $\epsilon = 0.0001$ , and initial point  $x_0 = 3$ :**

$$f(x) = x^2 - 4 \sin x$$

**Solution:**

```
f=inline('x^2-4*sin(x)');
d=inline('2*x-4*cos(x)');
x0=input('x0= ');
n=input('n= ');
disp('x0    x1')
for i=1:n
    if d(x0)==0
        disp('division by zero, can not proceed.')
        break
    end
    x1=x0-f(x0)/d(x0);
    disp([x0 x1])
    if abs(x1-x0)<=0.0001
        break
    else
        x0=x1;
    end
end
```

end

**Solution:**

x0=3

n=9

x0	x1
3.0000	2.1531
2.1531	1.9540
1.9540	1.9340
1.9340	1.9338
1.9338	1.9338

**Exercises:**

Q1\ Do exercises in your previous Lectures using Newton's Method

Q2\ Use all three methods in this Section to find solutions to within  $10^{-5}$  for the following problems.

a.  $3xe^x = 0$  for  $1 \leq x \leq 2$

b.  $2x + 3 \cos x - e^x = 0$  for  $0 \leq x \leq 1$