

```

> restart;
> newton0 := proc (p,tol,N,StartValue)
  local x,j,A,B,dp,g;
  dp:= unapply(diff(p(x),x),x);
  g:= x -> x - p(x)/dp(x);
  A:=StartValue;
  B:= g(A);
  print(1,B);
  for j from 2 to N while (abs(A - B) >= tol) do
    A:= B;
    B:= g(A);
    print(j,B);
  od;
end proc;

```

```

newton0 := proc(p, tol, N, StartValue)

```

(1)

```

  local x,j, A, B, dp, g;
  dp := unapply(diff(p(x),x),x);
  g := x->x - p(x)/dp(x);
  A := StartValue;
  B := g(A);
  print(1, B);
  for j from 2 to N while tol <= abs(A - B) do
    A := B; B := g(A); print(j, B)
  end do

```

```

end proc

```

```

> p:= x -> 0.4-1/x;

```

$$p := x \rightarrow 0.4 - \frac{1}{x}$$

(2)

Note that Newton for the above function gives the iteration $x \rightarrow x*(0.8 - x)$, which does not involve division

```

> newton0 (p,10^(-5),12,2.0);
1, 2.400000000
2, 2.496000000
3, 2.499993600
4, 2.500000000

```

(3)

```

> newton0 (p,10^(-5),12,5.1);
1, -0.203999999
2, -0.4246463978
3, -0.9214226209
4, -2.182453100
5, -6.270146814
6, -28.26619006
7, -376.1233804
8, -57339.76567
9, -1.315254170 109

```

10, $-6.919574154 \cdot 10^{17}$

(4)

> newton0(p,10^(-5),12,0.1);

1, 0.1960000000

2, 0.3766336000

3, 0.6965260526

4, 1.198992688

5, 1.822951990

6, 2.316642397

7, 2.486551996

8, 2.499927661

9, 2.499999998

10, 2.500000000

(5)

> newton0(p,10^(-5),12,-0.1);

1, -0.2040000000

2, -0.4246464000

3, -0.9214226260

4, -2.182453114

5, -6.270146867

6, -28.26619043

7, -376.1233895

8, -57339.76843

9, $-1.315254297 \cdot 10^9$

10, $-6.919575489 \cdot 10^{17}$

11, $-1.915220998 \cdot 10^{35}$

12, $-1.467228588 \cdot 10^{70}$

(6)