**Fixed point method**

First rewrite f(x) = 0 to x = g(x) for example x2- 3x +1 = 0 to x = (x2 + 1)/3.

|g’(x)| < 1 ie. slope of g(x) must be less than one.

x1 = g(x0)

x2 = g(x1)

.

.

.

xk+1 = g(k) where k = 0,1,2,3,…

Solve using fixed point interval:

x3-x-1=0

rewrite,

x = x3 – 1 or x = 3√(x+1) or x = 1/(x2 – 1)

taking second option:

g(x)= 3√(x-1)

suppose x0 = 2

x1 = g(x0)

= 3√(2+1) =

|  |  |
| --- | --- |
| Iteration | Xi =g(xi-1) |
| 0 | 2 |
| 1 | 1.4422 |
| 2 | 1.3466 |
| 3 | 1.3288 |
| 4 | 1.3255 |
| 5 | 1.3248 |
| 6 | 1.3247 |
| 7 | 1.3247 |

Therefore root is 1.3247

Alternative equation:

taking 4th option:

g(x)= √((x+1)/x)

suppose x0 = 2

x1 = g(x0)

= √((2+1)/2) = 1.2247

|  |  |
| --- | --- |
| Iteration | Xi =g(xi-1) |
| 0 | 2 |
| 1 | 1.2247 |
| 2 | 1.3477 |
| 3 | 1.3198 |
| 4 | 1.3257 |
| 5 | 1.3244 |
| 6 | 1.3247 |
| 7 | 1.3247 |

Root is 1.3247

fixed point method id linearly convergent ie. ρ = 1;