Bisection Method

Andrés Mateo Otálvaro, Santiago Suarez Perez,Daniel Ermilson Velásquez

September 11, 2015

Algorithm 1 Bisection

1: **procedure** BISECTION
2:     X_i
3:     X_s
4:     tol
5:     $iter$
6:     $Y_i = f(X_i)$
7:     $Y_s = f(X_s)$
8:     **if** $Y_i * Y_s > 0$ **then**
9:         "The roots are not equal"
10:     **else if** $Y_i = 0$ **then**
11:         "X_i is a root"
12:     **else if** $Y_s = 0$ **then**
13:         "X_s is a root"
14:     **else**
15:         $X_m = \frac{(X_i + X_s)}{2}$
16:         $Y_m = f(X_m)$
17:         $Error = tol *2$
18:         $Cont = 1$ //Because an X_m was already compute
19:         **while** $Y_m \neq 0$ & $error > tol$ & $cont \leq iter$ **do**
20:             **if** $Y_m * Y_i < 0$ **then**
21:                 $X_s = X_m$
22:                 $Y_s = Y_m$
23:             **else**
24:                 $X_i = X_n$
25:                 $Y_i = Y_m$
26:             **end if**
27:             $Aux = X_m$
28:             $X_m = \frac{(X_i + X_s)}{2}$
29:             $err = \|X_m - Aux\|$
30:             $Cont = Cont + 1$
31:         **end while**
32:         **if** $Y_m = 0$ **then**
33:             "X_m is a root"
34:         **else if** $error < tol$ **then**
35:             X_m is a root with an error of **error**
36:         **else if** $Cont > iter$ **then**
37:             "We have ran out of iterations"
38:         **end if**
39:     **end if**
40: **end procedure**