

# DIS 005

Raehyun Kim\*

## 1 Muller's method (fixed)

### Muller1.m

```
1 function [fun, x, out] = Muller1(Fun, x_in, params)
2 % On input:
3 %   Fun is function handle for the function
4 %   x contains the 3 initial guesses
5 %
6 % On output
7 %   fun contains all function values
8 %   computed by Muller
9 %   out.flg = 0 means success; otherwise method failed.
10 %   x(end) is the root if out.flg = 0.
11 %   out.it = # of iterations.
12 %
13 % Written by Ming Gu for Math 128A, Fall 2022
14 %
15 out.flg = 1;
16 x = x_in;
17 fun = ones(length(x),1);
18 if (length(x)<3)
19     return
20 end
21 N = params.MaxIt;
22 tolx = params.tolx;
23 tolf = params.tolf;
24 for k = 1:3
25     fun(k) = Fun(x(k));
26 end
27 for k = 3:N-1
28     c = fun(k);
29     dx2 = x(k)-x(k-2);
30     df2 = (fun(k)-fun(k-2))/dx2;
31     df1 = (fun(k)-fun(k-1))/(x(k)-x(k-1));
32     a = -(df2-df1)/(x(k-1)-x(k-2));
33     b = df2 + a * dx2;
34     Del = sqrt(b*b - 4.0 * (a * c));
35     dx = 2.0 * c / (b + sign(b)*Del);
36     x(k+1) = x(k)-dx;
37     fun(k+1) = Fun(x(k+1));
38     if (abs(fun(k+1)) < tolf || abs(dx) < tolx)
39         out.flg = 0;
40         out.it = k+1;
41         return;
42     end
43 end
```

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\*Department of Mathematics, University of California at Berkeley